EXHIBIT A

JMS III, LLC
TIRE ENGINEERING & TIRE FAILURE ANALYSIS
9656 North Mariners Crest
McCordsville, IN 46055
330-704-1762
e-mail - jsmith842@comcast.net

OCTOBER 19, 2015

JAMES E. FITZGERALD, ESQ.
THE FITZGERALD LAW FIRM
2108 WARREN AVENUE
CHEYENNE, WY 82001-3740

RE: GOODEN/CUBILLOS vs FEDEX, et al.
JMS III FILE NO. 15-032

Dear Mr. Fitzgerald.
Attached is my report in the above-captioned matter. Included with the report are a complete set of notes and photographs documenting the examination of the incident left front tire, the incident right front tire and wheel and associated materials as well as reference materials required to be in compliance with court rules. The inspection was conducted at JMS III LLC. Laboratory in McCordsville, IN on July 21, 2015.

I reserve the right to amend this report as additional pertinent information becomes available.

Please advise if you have any questions.

Best regards,

John M. Smith

John M. Smith
Forensic Consultant

GOODEN/CUBILLOS vs FEDEX et al.
JMSIII FILE NO. 15-032

I. ANALYSIS

A. Methods

My experience in the tire and wheel industries includes 29 years of association with The Goodyear Tire & Rubber Company and its subsidiary, Motor Wheel Company. During those years, my work touched upon all tire and wheel disciplines, including the development of knowledge of materials, design, processes, and quality control employed in design and manufacturing. I also gained experience in the areas of testing and analysis for the purpose of evaluating tire and wheel designs, compounds, and compliance with government and manufacturing standards. A great deal of my work involved the evaluation of failed tires and wheels. My work with tires and wheels has continued during the past twelve years with my association with Standards Testing Laboratories in Massillon, Ohio, an organization of which I am now a consultant and as president of JMS III LLC Forensic Consultant.

In my work at Goodyear and at Standards Testing Laboratories, and JMS III, LLC, Forensic Consultant, I have been involved in extensive testing of tires and wheels. In my work at Goodyear, I had an opportunity to work at one of the largest tire companies in the world and to work in association with people of different capabilities with respect to tire and wheel design, manufacture, and testing. In a number of instances, the types of tires and wheels I worked on were at the cutting edge of high performance or sophistication; for example, I worked on a tire and wheel that ultimately was used on the moon vehicle by NASA. I also worked in the race tire engineering department for eleven years while at Goodyear. I was responsible for developing new tire designs and tire compounds for racing applications in all disciplines of racing domestically and internationally. This included Indianapolis cars, Dirt cars, Stock cars, Motorcycles, Formula I cars, Sport cars, and Drag Racing cars. As part of my responsibilities, I would attend the various races to assist the race teams in vehicle set up and to monitor tire performance. Not only has my experience been wide-ranging, but my experience was cultivated and enhanced by the individuals with whom I worked at Goodyear and also the individuals with whom I now work at Standards Testing Laboratories.

Standards Testing Laboratories is the largest independent testing facility in the world for tires and wheels, and also vehicle-associated components. It is ISO certified as a testing facility under ISO 9000-2000 and ISO/IEC 17025:2005. It is also a developer and manufacturer of testing equipment. Standards Testing Laboratories evaluates these various items and it tests them for

manufacturers, individuals, governmental agencies, etc. Standards Testing Laboratories, in many instances, has been a pioneer in the area of tire and wheel testing of certain characteristics and failure modes. For example, Standards Testing Laboratories and SAE pioneered the J1981 SAE Impact Testing Machine. The genesis of this machine was to create a controllable means of impacting tires and wheels to determine the effect on the combination. As the machine work evolved, Standards Testing Laboratories has conducted literally hundreds of impact tests on tires and wheels and evaluated how tires and wheels reacted after they have been impacted. This is designed to give us a better view of what happens to tires and wheels in the real world. It is universally recognized that most individuals usually forget whether or not they impacted something while driving, and so they are not good historians. Without a particular history on the tire and wheel, examiners must fall back on their experience with impacted tires and wheels done in studies, evaluations, and tests, and those returned from the field.

This particular machine gives us enhanced understanding of impacts by greater control over various mechanisms and their evaluation. This has created a wider and deeper body of knowledge on the issue. In these hundreds of tests, we have been able to determine how tires and wheels react to certain types of impacts, and that gives us a better idea of how tires and wheels ultimately fail in these circumstances. It is fair to say that we probably have more experience with impacted tires and wheels than any other testing laboratory in the world.

Standards Testing Laboratories was founded in the early 1970's with the goal of providing individuals, corporations, manufacturers, and the government, a facility where tires, wheels, and other products could be objectively tested and evaluated to various standards and criteria. Standards Testing Laboratories has approximately 87,000 square feet under roof, and its facility in Massillon, Ohio, covers approximately 10 acres. It employs more than sixty (60) people on a regular basis. Standards Testing Laboratories also has the capability of running vehicle tests to determine how vehicles respond and drivers respond during tire disablements. I have personally run more than 75 tests in a variety of vehicles to establish, under documented and instrumented conditions, what the driver senses and feels, as well as the engineering capability built into the vehicle and steering mechanism.

Our goal at Standards Testing Laboratories is to provide the most objective set of opinions for our clients as possible. In certain instances, we have told manufacturers that tires were made defectively. Typically, tires that have been defectively manufactured in a chemical sense, will fail early in their lives, just as tires that fail in a mechanical sense, in terms of the defect, will also fail relatively early in their lives. In most instances, we have been able to determine that tires were not made defectively, but rather failed from causes associated with damage in the field. While the modern tire is an extremely

robust product, it can only take so much abuse and misuse. Tires are expected to, and therefore are designed to perform extensive functions in combination with the vehicle. This includes such things as acceleration, braking, cornering, and just providing support for the vehicle. It is both a static and dynamic product designed to run at various speeds under various loads, various road and weather conditions, for millions of revolutions.

As an extension of my testing experience, I have had the opportunity to learn how tires and wheels failed, not only in a laboratory setting, but also from field returns and warranty claims. I am familiar with the proper procedures of tire/wheel mounting, inspection, and repair, including, but not limited to, the determination of serviceability. One of the things we look at with respect to tire and wheel examination is whether or not the tire or wheel had been damaged in service and whether the tire or wheel remained serviceable. Indicia such as inconsistent wear patterns, damaged areas of the tire or wheel, and a variety of other factors within the forensic examiner's repertoire will tell the examiner a great deal about the service-life of the tire and wheel. We may have little accurate history of the service-life of the tire or wheel, or it may be colored by an individual's memory. This is why tire and wheel examiners try to rely as much as possible on the facts as they exist, based upon observations of the product.

The goal of forensic tire examiners is to try and come as close as possible in determining what caused a particular tire or wheel to fail. As part of achieving that goal, a tire and wheel examiner should use the available facts and evidence appropriately and not leave out important, recognizable anomalies, circumstances, or factors. In most instances, a visual and tactile examination will give a trained and experienced tire and wheel examiner with a background in testing, evaluations, and studies, sufficient evidence in order to draw a valid conclusion about why the tire or wheel failed. In many instances, we may know very little about the actual history of the tire and wheel, but when it fails, it usually leaves rather straightforward indicia which we can evaluate to a conclusion with a level of comfort and validity. Tires and wheels that fail in the field from things such as under inflation, overloading, or impact, give up a signature in their destruction which informs the examiner, based on good correlation with pre-existing examinations, experience, and testing, that the tire or wheel in a particular instance failed from conditions not associated with a design or manufacturing problem.

In terms of methods, manufacturers and those working forensically primarily rely on visual and tactile examination used in connection with known failure modes and experience. Manufacturers and laboratories also test and evaluate tires and wheels in a variety of ways under conditions such as overloading, under inflation, impact, high-speed failures, various road hazards, road conditions, and accident-related damage as a means of assisting in recognizing known failure modes.

The visual and tactile examination technique allows for a nondestructive means of evaluating the product to determine, if possible, why the product failed. It makes sense to look at the product to see what happened to it and to evaluate its state in light of known correlations and modes of failure. In some instances, it is impossible to determine why a tire or wheel failed; but in most instances, known failure modes leads to a conclusion based upon the visual and tactile examinations which, in correlation with prior testing, evaluations, studies, and experience, can lead the examiner to an opinion which is based upon a use of all the facts which are available and a conclusion which is consistent with those facts, the purpose of which is to work objectively toward a valid conclusion.

Tire and wheel failure examination involves a background in understanding how tires and wheels are made and actually fail under various circumstances. This can be learned through the testing and evaluation process in which tires and wheels are tested to failure to determine how they fail under certain circumstances. How those tires and wheels appear and what evidence they reveal after failure should lead the examiner to a correlation of conditions with certain known tire and wheel failure modes. In some instances, accurate history from the field may also provide information consistent with what the examiner discovers on the tire and wheel.

What has been discovered over the years is that tire and wheel failures are heavily influenced by the actual service of the tire and wheel with respect to its size and type, vehicle application, actual use, road conditions, maintenance, repair, etc., all of which depends significantly on how individuals treat their tires and wheels, whether they replace them when they should, put air in them when they should, and avoid impacting them or otherwise subjecting them to road hazards.

In my present association with Standards Testing Laboratories, I continue to work in the field of tire and wheel testing, evaluation, failure analysis, vehicle controllability, as well as considerations of various designs, materials, and processes.

B. Findings

The tires, wheel and associated materials were examined on July 21, 2015 at the JMSIII LLC, Laboratory in McCordsville, IN. Detailed examination notes and photographs are attached.

The following are my findings of my visual and tactile examination of the incident tire and wheel.

For reference purposes, the serial number is designated as 12:00 o'clock, with the clock face correctly displayed on the serial number side of the tire. The non-serial side sidewall is similarly identified, but the clock face is reversed so that clock positions correspond on either side of the tire. The tread ribs and grooves are numbered sequentially, starting on the serial number side. The examination was nondestructive, and the evidence was not altered or changed. The wheel is identified by designating the valve as 12:00 o'clock, with the clock correctly displayed on the valve side, but in reverse on the non-valve side. The examination was nondestructive, and the evidence was not altered or changed.

The tire's sidewall contains molded information typically used throughout the tire industry on truck tires. Specific language used in the molded information is recorded in my examination notes for the tires, which are attached.

The incident tire, right front is a 275/80R22.5 CONTINENTAL HSL2 the tire's DOT serial number is A3DF1YJ4911. The serial number indicates that the tire was manufactured at the CONTINENTAL/GENERAL tire manufacturing plant in Mount Vernon, IL during the 49th week of 2011.

The tread is dirty and the serial side rib edges are rounded 360°. There is irregular river wear, severe heat discoloration and skid abrasion across the tread 360°. There is a circumferential cut/gouge out of rib 4 from 2:45 to 4 o'clock. There are numerous cuts/gouges/abrasions across the tread from 6 to 7:15 o'clock. The remaining tread depth varied from 4 to 9/32nd of an inch on the two outer grooves and from 11 to 13/32nd of an inch on the four center grooves.

The serial side sidewall is dirty and has skid abrasion on the shoulder 360°. The tread is heat discolored and has intermittent light abrasions/cuts 360°.

The serial side bead is heat discolored and has a moderate wheel flange impression. There are cuts in the heel/base from 9 to 11 o'clock (dismount damage?).There is mold flash above the mold ring junction on the bead face.

The non-serial side sidewall is dirty, heat discolored with intermittent light abrasions/cuts.

The non-serial side bead has a moderate wheel impression, is heat discolored and has a white residue 360° (mounting lube?).

The inner casing has heat discoloration in both upper sidewalls and both shoulders 360°

The incident wheel, right front was not submitted for inspection.

The incident tire, left front is a 295/75R22.5 Bridgestone R283 V-STEEL RIB ECOPIA. The tire's DOT serial number is 2CBT3WU1314. The serial number indicates that the tire was manufactured at the BRIDGESTONE tire manufacturing plant in Morrison, Tennessee during the 13th week of 2014.

The tread area is dirty. The tread and portions of the belts are torn off from 4:30 to 9:15 o'clock. The tread is heat discolored 360° and there are numerous radial splits across the crown from 10:30 to 1:15 o'clock with belt wires loose and frayed. A separate piece of tread and belts fits from 10:45 to 2:30 o'clock this piece has severe heat discoloration and rubber reversion present on the bottom surfaces. The remaining tread depth varied from 10 to 13/32 of an inch. The outer grooves are difficult to measure due to the step off between the grooves. There is intermittent road abrasion on the crown where exposed. There is skid abrasion across the crown and non-serial side shoulder from 10 to 11 o'clock.

The serial side sidewall is dirty and heat discolored. There is a radial split in the mid and upper sidewall at12:30 o'clock. There are radial splits at 11:15 and 11:30 o'clock and an irregular radial split from the lower to upper sidewall at 8:15 o'clock.

The serial side bead has a deep wheel flange impression, severe heat discoloration and a groove abraded in the base 360°. There are small cuts in the base at 5:15 and 6:15 o'clock and a diagonal cut in the face/heel at 12:45 o'clock. The heel and base are rolled in 360°.

The non-serial side sidewall is dirty, heat discolored and has an impact abrasion in the upper sidewall at12:15 o'clock. There is a circumferential break in the upper sidewall from 11:30 to 12:45 o'clock with radial splits at each end of the break. The wire ends exhibit fatigue and tensile breaks with some ends now peened.

The non-serial side bead has a deep wheel flange impression and is heat discolored. There is a gouge/abrasion in the face/heel/base at 11 o'clock with

the chipper wires exposed. There is a cut in the base at 12 o'clock and the heel/base are rolled in 360°.

The inner casing has heat discoloration in both upper sidewalls and both shoulders 360°and is a little dirty. There is skid abrasion in the liner from 11 to 1 o'clock. There is a cut in the serial side shoulder from the inside not through.

The incident wheel left front is a 22.5x8.25 ALCOA aluminum wheel. The wheel has sustained massive accident damage. This damage occurred during the accident sequence. The valve cap is missing with the threads dirty indicating no recent use of a valve cap.

II. OPINIONS

A. The following opinions are made with a reasonable degree of engineering and scientific certainty.
B. The maintenance of the vehicle and all components including the tires is the responsibility of the vehicle operator. This includes replacement of any of the vehicle components due to age or wear.

C. Careful consideration of the tires, in terms of inspection, analysis, and based on my training and experience, did not reveal to me any defects in design or manufacture. The tires, based on my examination, did not contain a defect in the adhesion system, and presented nothing that appeared to me to be in the nature of contamination or improper use of materials. I did not see any processing problems or other manufacturing problems associated with the tires. The various components of the tires appeared to be appropriately designed, developed, and constructed, including the carcass, bead, inner liner, tread, belts, and associated components.

D. Careful consideration of the wheel, in terms of inspection, analysis, and based on my training and experience, did not reveal to me any defects in design or manufacture.

E. The failure of the, left front, incident tire is directly related to chronically operating the tire in an under inflated/overdeflected condition. Evidence of underinflated operation in the left front tire is the heat discoloration observed throughout the tire, the heat reverted rubber observed in the separate piece of tread and steel belts, and the wheel flange grooving observed in the bead areas of the tire.

F. A review of the GPS data from the vehicle indicate that it was operated at high speed. High speed operation causes a tire to run hotter than normal. This is especially true in an underinflated tire.

G. The right front tire is a different size than the left front tire. The tire has irregular, river wear, and should have been removed from the steer axle. Typically in the industry a tire in this condition is retreaded or moved from the steer axle to a rear or trailer position.

H. The left front additionally has suffered a severe impact in the upper sidewall as evidenced by broken ply wires in that area of impact. Although this is not the primary cause of the tire failure it is a contributing factor since the tire is weakened in this area.

I. After reviewing the various depositions and discovery materials I could not find any evidence of a regular practice of checking the inflation pressures at a specific interval. It is common practice in the industry to frequently check the tire pressures with a tire pressure gauge and to have a plan in place to train employees as to the proper method and timing to ensure that tire pressures are properly maintained..

J. In a properly maintained vehicle the forces generated in a tire failure are small and not of sufficient magnitude to cause a vehicle to leave its lane of travel.

K. In a properly maintained vehicle the forces generated in a left front tire failure, as in this case, will exert a small force to pull the vehicle to the left. These forces are of a similar magnitude than those encountered in a normal lane change maneuver.

L. The forces generated in a tire disablement, as in this case, are not enough to cause loss of vehicle control by a typical driver. Many instrumented vehicle controllability studies have been run on a variety of cars, vans, trucks, and trucks towing trailers. In all cases, the forces that were generated could easily be controlled by the typical driver. Tire disablements in the vehicle studies consisted of blowouts, tread and top belt separations, and a combination of both disablements. Typically, these forces are in the magnitude of or less than those generated in a normal lane change maneuver. Additionally, I have done many un-instrumented studies involving front tire blowouts in medium truck and trailer combinations. In all cases, the vehicle was easily controlled.

M. There have been numerous studies and articles dealing with the ability of individuals to control their vehicles during a tire disablement. A number of the studies have involved untrained drivers who were not anticipating tire disablements, and others who had very little anticipation of the sudden event of a tire blowout. The studies, tests, and evaluations performed are consistent with the studies that I have conducted and which have been routinely documented. The use of a wide variety of vehicles for these

studies establishes that, across the board, tire disablements can be handled by drivers under most circumstances without difficulty. In the final analysis, Mr. Kehler lost control of the vehicle after a tire disablement. While 99.4 percent of the drivers are able to handle tire disablements without losing control. This is driver-induced behavior and is not caused by the fact that the tire became disabled. A disabled tire on a vehicle does not cause the vehicle to go out of control since the forces which are involved are small.

III. BASIS FOR OPINIONS

A. Formal Education: B.S. Chemical Engineering from New Mexico State University

B. Work Experience: 47 years in the tire and wheel industries, including 29 years with Goodyear in various technical, engineering, and managerial positions dealing with tire development, manufacturing, analysis, testing, and quality assurance. 33 years of product liability work involving tires, vehicles and wheels.

C. Since 1997, at Standards Testing Laboratories, I have been involved with a variety of testing (laboratory, track, and highway) of tires, wheels, and vehicles. The emphasis of these studies has been focused toward forensic research.

D. The use and application of scientific principles, techniques, and the body of knowledge as described in Section I.

E. Examination of the tire and wheel as described in the body of this report.

F. Information provided.

IV. EXAMINATION NOTES

See attachment

V. PHOTOGRAPHS

See attachment

VI. QUALIFICATIONS

See attachment

VII. COMPENSATION RATE

$300 per hour

VIII. PREVIOUS TESTIMONY LIST

See attachment

IX. MATERIALS AVAILABLE FOR REVIEW

A. Brian Kehler deposition dated August 18, 2015.

B. Steve Marks deposition dated September 30, 2015.

C. Chris Rodwick deposition dated August 14, 2015..

D. Brian Quesier deposition dated July 24, 2015.

E. Wyoming Highway Patrol report dated November 12, 2014.

F. Vehicle tire placard photograph.

X. REFERENCES

A. See attached disc of technical papers.

B. J. M. Smith, G.C. Bolden, T.R. Flood, Impact Simulations in the lab, Presented at TIRE TECHNOLOGY INTERNATIONAL 2001.

C. J.M. Smith, G.C. Bolden, T.R. Flood, Impact simulations – What Happens when A Tire/Wheel Impacts a Road Hazard Presented at TIRE TECHNOLOGY INTERNATIONAL 2005.

D. J.M. Smith, G.C. Bolden, T.R. Flood, Impact simulations – What Happens When a Tire/Wheel Impacts a Road Hazard, presented at TIRE TECHNOLOGY INTERNATIONAL 2006.

E. C.L. Schnuth, R.L. Fuller, G.D. Follen, J.M. Smith, Compression Grooving and Rim Flange Abrasion as Indicators of Over-Deflected Operating Conditions in Tires, presented at ACS, Rubber Division, Cleveland, OH, October 21-24, 1997.

F. C.L. Schnuth, J.M. Smith, G.C. Bolden, and T.R. Flood, Effects of Over-Deflection on the Tire/Rim Interface, based on Paper No. 31A, presented at the International Tire Exhibition and Conference, Akron OH, September 15-17, 1998, and Testing Expo '99, Hamburg Germany, June 8-10, 1999.

G. C.L. Schnuth, R.L. Fuller, G.D. Follen, C.G. Gold, Standards Testing Laboratories, Compression Grooving as Indicators of Overdeflected Operating Conditions in Tires, presented at Testing Technology International '97, June, 1997.

H. Baker, J.S. and G.D. McIlraith, Tire Disablements and Accidents on High Speed Roads, Traffic Institute, Northwestern University, 1968.

I. J.D. Gardner and C.G. Shapley, the Role of Blowouts in Accident Causation, ASME, 1987.

J. E. Klein and T.L. Black, Anatomy of Accidents Following Tire Disablements, SAE, 1999.WE. Blythe, T.D. Day, and W.D. Grimes, 3-Dimensional Simulation of Vehicle Response to Tire Blowouts, 980221.

K. Richard J. Fay and Ric D. Robinette, Fay Engineering Corporation; J.M. Smith, T.R. Flood, and G.C. Bolden, Standards Testing Laboratories, Drag and Steering Effects from Tire Tread Belt Separation and Loss, presented at the SAE Congress International Congress and Exposition, Detroit MI, March 1-4, 1999.

L. Calvin P. McClain, Jr., and Michael D. DiTallo, Tire Examination after Motor Vehicle Collisions, Chapter 8 of Traffic Collision Investigation, Northwestern University Center for Public Safety.

M. J.D. Gardner and B.J. Queiser, The Pneumatic Tire, Chapter 15 from Introduction to Tire Safety, Durability and Failure Analysis, NHTSA.

N. Harold J. Herzlich, Belt Misalignments and Belt/Belt Tear Patterns, ITEC, 2002.

O. Harold J. Herzlich, The Effect of Snaked Belt Anomalies on Tire Durability, ITEC, 2000.

P. Joseph L. Grant, Rim Line Grooves as an Indicator of Underinflated or Overloaded Tire Operation in Radial Tires, ITEC, 2004.

Q. Consumer Reports Special Report, Innerliner Study, November 2001.

R. The Tire and Rim Association, Inc. Yearbooks

S. Rubber Manufacturers Association, Care and Service of Automobile and Light Truck Tires

T. Bennett Garfield Publication, Tire Guide

U. Jim Rancourt, Monty Hayes, Polymer Solutions, Do Liner Patterns Affect Performance, Gary Bolden, John Smith, Tim Flood, Standards Testing Laboratories, Component Interfacial Tear Appearances, ITEC, September, 2004.

I reserve the right to amend and supplement my opinions based upon all discovery, disclosures, and other materials which might come to light or be available during the course of this case.

Please advise if you have any questions.

Best regards,

John M. Smith

John M. Smith
Forensic Consultant

JMS III, LLC
TIRE ENGINEERING & TIRE FAILURE ANALYSIS
9656 North Mariners Crest
McCordsville, IN 46055
330-704-1762
e-mail - jsmith842@comcast.net

March 14, 2016

JAMES E. FITZGERALD, ESQ.
THE FITZGERALD LAW FIRM
2108 WARREN AVENUE
CHEYENNE, WY 82001-3740

RE: GOODEN/CUBILLOS vs FEDEX, et al.
JMS III FILE NO. 15-032

Dear Mr. Fitzgerald.
Attached is my supplemental report in the above-captioned matter. I have reviewed additional materials supplied to me in the above captioned case as listed in the materials available for review. An updated list is attached to this report. After a thorough review of these additional materials I found nothing contained in these materials which would change my opinions expressed in my previous reports.

I reserve the right to amend this report as additional pertinent information becomes available.

Please advise if you have any questions.

Best regards,

John M Smith

John M. Smith
Forensic Consultant

IX. Materials Available for Review

A. Brain Kehler deposition dated August 18, 2015.

B. Steve Marks deposition dated September 30, 2015.

C. Chris Rodwick deposition dated August 14, 2015.

D. Brian Queiser deposition dated July 24, 2015.

E. Wyoming Highway Patrol report dated November 12, 2014.

F. Vehicle tire placard photograph.

G. Documents Produced by Bridgestone Americas Tire Operations, LLC:

1. 1570000087 to 1570000599 (Radial Tire & Disc Wheel Service Manual, Radial Tire Conditions Analysis Guide, March 2014 Truck Tire Data Book, 2014 Year Book of The Tire and Rim Association, Inc.)
2. 1570000600 to 1570000900 (Tire Specifications, Tire Development Information, Claims Data, Warranty Adjustment Data, Production Data)
3. 1570000901 to 1570002095 (Test Results)
4. 1570002096 to 1570002129 (Production Standards, Test Results)
5. 1570002943 to 1570002944 (Test Results)
6. 1570002945 to 1570008670 (Statistical Studies/Analyses)
7. 1570008671 to 1570008691 (Updated Production, Claims and Adjustment Data, and Innerliner Design)
8. 1570008735 to 1570009324 (Adjustment Manual)
9. 1570009324 to 1570012138 (Statistical Studies/Analyses).
10. 1570015016 to 1570016130 (Test Results)

11. 1570016156 to 1570016500 (Test Results)

H. Documents Produced by FedEx Ground Package System, Inc.:

1. C&G-FXG-000234 to 000247 (DDEC Reports)
2. C&G-FXG-000748 to C&G-FXG-000754 (X-Rays Taken by William Woehrle)
3. C&G-FXG-000932 to C&G-FXG-000943 (X-Rays Taken by William Woehrle)
4. C&G-FXG-002549 to C&G-FXG-002558 (DDEC Reports).

I. Thomas D. Gillespie's Report dated November 23, 2015.

J. Joseph L. Grant's Report dated November 25, 2015 and Supplemental Report dated February 4, 2016.

K. Jerry S. Ogden's and Mathew Martonovich's Report dated November 8, 2014.

L. Peter A. Philbrick's Report dated November 23, 2015.

M. Brian J. Quieser's Report dated December 1, 2015 and Supplemental Report dated February 5, 2016.

N. Dennis Ritchie's Report dated October 31, 2015.

O. John Scott's Report dated November 23, 2015 and Supplemental Report dated March 3, 2016.

P. William J. Woehrle's Report dated November 24, 2015.

Q. William J. Woehrle's deposition dated January 19, 2016.

R. Brian J. Queiser deposition dated February 9, 2016.

S. Joseph L. Grant's deposition dated February 10, 2016.

T. David Johnson deposition dated February 24, 2016.

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McCordsville, IN 46055
330-704-1762
e-mail - jsmith842@comcast.net

RESUME

JOHN M. SMITH

EDUCATION

B.S. Chemical Engineering, 1968 - New Mexico State University
Member, Tire Society, SAE, ASTM, Akron Rubber Group, Rubber Division ACS

EXPERIENCE

JMS III – TIRE ENGINEERING & FAILURE ANALYSIS CONSULTANT

President – August 2009 to Present
Examination, failure analysis and testing of tires, rims, vehicles, and related products involved in litigation; principal engineer, tire consulting projects. Consultant to Standards Testing Labs.

STANDARDS TESTING LABORATORIES, INC. MASSILLON, OHIO http://stllabs.com/

Corporate President - March 2001 to August 2009

Vice President, Trans Tech Division - March 1998 to March 2001

Manager, Trans Tech Division - August 1997 to March 1998

Principal Engineer, Trans Tech Division - June 1997 to August 1997

THE GOODYEAR TIRE & RUBBER COMPANY - AKRON, OHIO

Synopsis: Factory and Field Service – June 1968 to Present
Race tires, Passenger tires, Motorcycle tires, Bicycle tires, Bias and Radial Medium Truck tires, Airplane tires, Industrial tires and Bias and Radial OTR tires. Start up of new tire lines at various Goodyear manufacturing factories both domestic and international including production startup, check tire building, and auditing all phases of tire manufacturing from raw materials to examination of failed tires in the factory and in the field. In OTR tires I have visited the Goodyear factories domestically and internationally. I have performed OTR failure analysis at mines in the southwest, Morocco, Alaska and in the manufacturing factories.

Principal Engineer, Product Analysis - December 1989 to June 1997
Engineering examination and forensic analysis of passenger, truck, agricultural and OTR tires, rims and related products involved in claims against Goodyear.

Senior Tire Engineer, Product Analysis - June 1981 to December 1989
Liaison to Law Department; examination and analysis of tires, rims and related products involved in claims against Goodyear. Experience in radial tire manufacturing methods, equipment and materials. Performance evaluation, accelerated aging/testing methods.

Senior Compounder, Product Development Passenger Tires - November 1978 to June 1981
Design and construction engineering on new radial tire lines for OEM vehicles.

Chief Compounder - Race Tire Engineering - November 1977 to November 1978
Manage, train and guide nine compounders to develop new materials and compounds, tire testing and race service. Coordinate European efforts in Formula I and Motorcycles.

Group Leader - Race Tire Engineering - October 1974 to November 1977
Tire design including mold design, tread pattern design and all calculations for strength, etc. Coordinate all phases of sports car, championship and motorcycle racing.

Compounder - Race Tire Engineering - June 1968 to October 1974
Development of compounds for tread, carcass, sidewall, bead and special applications and new materials.

DOW CHEMICAL COMPANY - FREEPORT, TEXAS (summer employment)

Materials and Methods Development - June 1967 to September 1967
Design and implementation of materials and methods for field repairs to pipelines, reactors, development and evaluation of new coatings and linings.

NEW MEXICO STATE UNIVERSITY - LAS CRUCES, NEW MEXICO

Chemical Engineering Department - January 1966 to June 1968
Design, fabrication and start-up of various chemical processes used in instruction of laboratory and associated classes.

U.S. ARMY

Senior Assembly Specialist - January 1964 to January 1966
Nuclear warheads for the Honest John and Little John missile systems - medical volunteer.

U.S. FOREST SERVICE - ALPINE, ARIZONA

Between school semesters - September 1960 to January 1964
Timber and watershed control, fire prevention and fighting, optimizing wildlife and environments.

A.T. & S.F. RAILWAY - ALBUQUERQUE, NEW MEXICO

Sheet metal and diesel apprentice on locomotives - July 1959 to September 1960

CONTINUING EDUCATION

SAE Failure Analysis
SAE Vehicle Rollover Toptec
SAE Accident Reconstruction
Tire Characteristics/Vehicle Dynamics
SAE Accident Reconstruction
Triodyne Accident Reconstruction
Product Liability
Bertil Roos Driving School
NATC Tire, Truck and Passenger Car Dynamics

PUBLICATIONS

Compression Grooving and Rim Flange Abrasion as Indicators of Over-Deflected Operating Conditions in Tires, by C.L. Schnuth, R.L. Fuller, G.D. Follen, J.M. Smith, Standards Testing Laboratories. Presented at ACS, Rubber Division, Cleveland, OH, October 21-24, 1997

Drag and Steering Effects from Tire Tread Belt Separation and Loss, Richard J. Fay and Ric D. Robinette, Fay Engineering Corporation; J.M. Smith, T.R. Flood and G.C. Bolden, Standards Testing Laboratories. Presented at the SAE International Congress and Exposition, Detroit, MI, March 1-4, 1999

Effects of Over-Deflection on the Tire/Rim Interface, C.L. Schnuth, J.M. Smith, G.C. Bolden, T.R. Flood, Standards Testing Laboratories. Based on Paper No. 31A, Presented at the International Tire Exhibition and Conference, Akron, OH, September 15-17, 1998, and Testing Expo '99, Hamburg, Germany, June 8-10, 1999

Impact simulations in the lab, G.C. Bolden, J.M. Smith & T.R. Flood, Standards Testing Laboratories. Presented at Tire Technology International 2001.

Component Interfacial Tear Appearances, Gary Bolden, John Smith, Tim Flood, Standards Testing Laboratories. Presented at ITEC, September, 2004

What Happens when a Tire/Wheel Impacts a Road Hazard, Gary Bolden, John Smith, Tim Flood, Standards Testing Laboratories. Presented at Tire Technology International 2005

What Happens when a Tire/Wheel Impacts a Road Hazard, Gary Bolden, John Smith, Tim Flood, Standards Testing Laboratories. Presented at Tire Technology International 2006

PATENTS

Pneumatic Safety Tire, Self-Supporting Tire, Patent No. 1164324

EXHIBIT B

Kenneth L. Pearl

Accident Reconstruction & Tire Failure Analysis

22647 Ventura Boulevard, #341 Woodland Hills, CA 91364

Telephone: (310) 200-7272 Fax: (818) 225-7279

e-mail: kenpearl@usa.net

April 25, 2019

Mr. Dave Schaller
Wheeler Trigg O'Donnell
370 Seventeenth Street, Suite 4500
Denver, CO 80202

RE:		Richard v. Fed Ex
	Date of Loss:	11/8/2014
	My File No.:	02645

Tire Failure Analysis

Introduction:

An accident occurred when the left front tire failed on a 2011 Freightliner tractor pulling two trailers driven by Brian Kehler and the truck veered left across the center divider and collided with other vehicles.

The objective of this analysis was to determine the cause of the tire failure. The analysis was based on a review of file material, inspection of the failed tire, and researched tire data.

This report may be supplemented or amended at any time should additional pertinent information become available.

Tire Background of Kenneth L. Pearl:

I am self-employed providing expert analysis and testimony related to tire performance and accident reconstruction. I received a Bachelor of Science degree in Mechanical Engineering from the University of Massachusetts.

In July, 1979, I began working for General Tire & Rubber Company. My initial assignment was at the Mt. Vernon, Illinois, tire factory which produced steel belted radial passenger tires and all-steel radial truck tires. I was assigned to the experimental tire production group where I participated in an engineering capacity in all aspects of tire manufacturing from the mixing of raw materials to the final inspection of finished tires. This included the extrusion of rubber compounds into tread and sidewall components, calendaring of wire and polyester, stock preparation, tire assembly and curing. My objective during this assignment was to become familiar with the manufacturing processes for radial passenger tires and radial truck tires.

In early 1980, I was assigned to the Tire Development Department in Akron, Ohio, as a Development Engineer. I completed assignments related to improving tire durability, reducing cost and improving efficiency by standardizing specified components. These assignments included programs for improving belt edge durability in steel belted radial passenger tires, improving lower sidewall durability with increased bead filler height and reducing tire weight and cost by reducing sidewall thickness.

The belt edge durability program and standardization programs included evaluations of various belt wire styles, end-counts and calendared gauges. Construction features specifically related to the belt edges that were evaluated included belt widths and step-offs, belt profiles, rubber thickness between the belt edges and above the belt edges and the addition of nylon cap plies and belt edge strips.

All of the evaluated construction features were subjected to a test regimen that included laboratory pulley wheel testing for durability and high speed and various types of vehicle fleet tests. The vast majority of the tests were run to failure and my assignment included personally inspecting all of the failed tires. Frequently, construction test programs would be combined with compound development programs to evaluate changes to the belt skim and other related compounds.

In June of 1982, I was promoted to Senior Development Engineer and assigned to the Original Equipment Group. I was responsible for various vehicle programs for original equipment applications on General Motors vehicles and assisted on programs for Ford and Nissan. I was assigned to interface with General Motors for tire submissions from Toyo Tire of Japan. The OE tire programs would begin with an objective tire performance specification from the vehicle manufacturer including tire weight, rolling resistance, traction, force & moment, etc. After a particular tire design was determined, various tire construction and compound features were evaluated to first assure compliance to the objective specifications then to provide a range of subjective ride and handling choices for the vehicle engineers. Joint ride and handling evaluations were conducted with the vehicle engineers and the tire engineers.

During the approximately 4½ years that I was in Tire Development in Akron, I regularly attended monthly adjustment or warranty meetings. At these meetings, samples of tires returned by consumers were inspected by Tire Development, Quality Assurance and Manufacturing representatives. The evaluations were designed to look for specific failure patterns in tires, determine why the tires failed, and, where necessary, to evaluate the impact of the design, development, testing, and manufacturing processes on the failures seen in the field.

02645kp

In June of 1984, I was promoted to Uniformity Improvement Coordinator. This was a newly created position reporting to the Vice President of Manufacturing. My assignment was to determine and implement manufacturing and tire design changes as needed to significantly improve tire uniformity performance. While in this position, I spent between one-third and one-half of my time in various General Tire factories where I conducted and coordinated evaluations of most of the processes involved in tire manufacturing to determine the effect of those processes on tire uniformity. I evaluated performance capabilities of new process equipment from numerous suppliers. Where appropriate, General Tire factory processes were modified either by changes to equipment or procedures.

Evaluations of many aspects of tire design were also performed in cooperation with Tire Development with appropriate design modifications implemented as required.

I reported the results of evaluations and actual factory performance monthly in a meeting attended by the President of the company, Vice-Presidents of Manufacturing, Tire Development and Quality Assurance and the Factory Managers and their staffs (via telephone).

On my recommendation, a separate Uniformity Department was established in each of General Tire's North American factories that produced steel belted radial passenger car tires.

While in this position, I conducted process performance inspections (audits) at General Tire's radial tire producing North American tire factories and at affiliated tire factories in Europe, North Africa and South America. Process capabilities of samples from all areas of the factories were determined and reported with recommendations for methods of improvement to the factory management.

In late 1987, General Tire was purchased by Continental Tire, a German company. The Vice President of Manufacturing was replaced with a Continental manager whom I assisted in the transition as I was finalizing my Uniformity Improvement Coordinator duties.

In June of 1988, I was promoted to Technical Manager at the Mayfield, Kentucky tire factory. This was a newly created position, reporting to the factory manager that was established in each of General Tire's factories to parallel the organization in Continental's factories.

As Technical Manager, I was responsible for the compliance of all tires to all company specifications. At that time, Mayfield produced approximately 20,000 tires each day including radial passenger, radial light truck and various bias construction tires. The Tire Engineering, Tire Compounding, Quality Assurance and Uniformity departments reported to me. My office was located within the tire factory and I spent approximately half of every day in the production areas of the factory. I attended a daily meeting of technical and production managers where all tires sorted from production by inspectors were reviewed and necessary corrective actions were taken. I assisted in establishing and overseeing a multi-disciplinary team that determined the most effective method to refurbish a particular population of tire assembly machines to realize the maximum performance improvement for the required cost. The most significant performance gains were made with improvements to the machines' belt placement capability.

During my 10½ years at General Tire, I was involved with tire design, development, manufacturing, application and failure analysis. I personally evaluated variations in tire constructions and materials and manufacturing process. As a result of these evaluations and my other duties, experiences and training at General Tire, I gained expertise in the design, construction, manufacture, performance, testing and failure analysis of various tire types. I developed, tested and wrote specifications for high volume (> 1 million per year) Original Equipment tires. I developed and tested modifications for existing tire designs that resulted in changes to the specifications of hundreds of different tires. I have personally inspected over 10,000 tires that were tested to failure, returned as defective by consumers, or sorted as defective by factory inspectors.

In November of 1989, I left General Tire to become a Staff Engineer for Vollmer-Gray Engineering Laboratories in Long Beach, California. In that position, I provided expert analysis and testimony relating to tire performance and accident reconstruction on over 1,700 assignments.

In July of 2000, I left Vollmer-Gray Engineering to continue the same functions independently. Since then, as a self-employed independent expert, I have provided expert analysis and testimony on over 2,600 assignments.

I served as a "core" expert witness on tire design in the Federal Multi-District Litigation proceedings in Indianapolis which involved design and performance issues related to the recalled Firestone Radial ATX and Wilderness AT tires that had been original equipment on Ford Explorers.

Since leaving General Tire, I have consulted on over 800 tire cases. While the majority of these cases have involved steel belted radial passenger and light truck tires, I have analyzed all types of tires used on all types of vehicles including heavy trucks, motorcycles, bicycles, trailers, fork lifts, etc. I have been retained by representatives of both plaintiffs and defendants, including tire manufacturers, to determine why tires failed, how they failed, and the specific causes of tire failures as it might relate to the design and/or manufacturing process as well as usage and maintenance of the tires.

File Material Reviewed:

Wyoming Highway Patrol Report P2014178331

11/23/2015 report by John Scott of Fay Engineering

12/1/2015 and 4/1/2016 reports by Brian Queiser of Bridgestone Americas

11/25/2015 report by Joseph L. Grant

10/19/2015, 11/19/2015 and 3/14/2016 reports by John Smith

Pre-accident Information:

Mr. Scott's report indicated that the accident occurred at approximately 2:55 PM on Saturday 11/8/2014, when Brian Kehler was driving the 2011 Freightliner pulling two trailers traveling westbound on I-80 in Cheyenne, Wyoming. The left front tire failed and the vehicle traveled from the right lane across the left westbound lane and shoulder and the center median and into the eastbound lanes where it collided with two vehicles.

Reportedly, the truck had been purchased in March 2014 and was last serviced at 516,921 miles. At a post-accident inspection, the truck odometer showed 520,897 miles. A Commercial Tire invoice and Kehler's testimony indicated that two Bridgestone R283 tires were installed on the front axle of the Freightliner on August 26, 2014. A FleetNet invoice indicated that the right front tire failed from a tread separation on September 27, 2014, but the tire did not go flat and Kehler was able to pull to the side of the road and the spare tire was installed on the right front. The front tires were reportedly balanced on October 28, 2014 when a drive axle tire was installed. A Redbone Diesel invoice from November 5, 2014, noted adjust brakes and tire pressures.

Mr. Scott identified a piece of tire tread shown in several Wyoming Highway Patrol photographs which was apparently not recovered or preserved.

Tire Inspection:

The failed left front tire was received along with a separate piece of tread/ belt assembly. Molded sidewall markings identified the tire as a size 295/75R22.5 Bridgestone R283 V Steel Rib Ecopia radial truck tire manufactured at the Bridgestone Warren Plant in Morrison, TN, during the 13th week of 2014. The tire construction was one steel body ply and 4 additional steel belts with a maximum load capacity of 6,175 pounds at 110 PSI maximum inflation pressure.

The tire had experienced a tread separation and partial tread and belt detachment and there was obvious subsequent damage to the tire casing which occurred during the accident after the tire failed. Using the DOT serial number as 0 degrees, from about 345 degrees clockwise to about 25 degrees, the tread and all of the belts were separated from the casing and the casing wires were broken at the nonserial shoulder. The beginning of the #1 and #2 belts started at 25 degrees on the nonserial shoulder; the #3 belt started at 125 degrees and the tread started at 135 degrees. Full width tread and all belts were attached from about 190 to 200 degrees then the loose tread/belt piece reached to about 270 degrees. The separate tread/belt piece was about 44 inches long and matched to the casing at 330 degrees on the serial shoulder and about 90 degrees on the nonserial shoulder. The four major tread ribs exhibited smooth even wear both circumferentially around the tire and across the tread with remaining tread depths between 12/32nds and 13/32nds of an inch.

Figure 1 is a view of the serial sidewall of the tire casing and Figure 2 is a closer view of the serial side bead with a pattern that was transferred to the tire from the aluminum rim. The pattern reflects wear that occurred to the rim during the more than ½ million miles it was used with numerous various tires. Figure 3 is a view of the nonserial sidewall of the tire casing and Figure 4 is a closer view of the nonserial side bead with a somewhat different wear pattern transferred form the other side of the aluminum rim.

Figure 5 and Figure 6 show the shoulder area of the innerliner of the tire on the nonserial and serial sides respectively.

Figure 7 shows the area of the casing where the tread and all belts were missing and Figure 8 shows the square edge of the tread shoulder at that location. Figure 9 shows the area of the casing where the full tread was attached and Figure 10 shows the square edge of the tread shoulder at that location.

Figure 11 shows a localized area of the nonserial side tread shoulder where the outermost groove was worn completely away, indicated by the arrow near the center of the photograph. The groove can be seen on either side of the worn area, in Figure 11 and Figure 12, where it was approximately 6/32nds of an inch deep. Localized wear patterns such as this are caused when a long term internal separation, typically between the belts, allows the tread to squirm as it goes through the footprint; this squirming causes faster wear to the tread in the area above the separation. As the tire continues to be used, the separation will grow circumferentially and across the tread. Figure 13 shows polishing on top of the #2 belt where the separation extended to approximately 275 degrees on the nonserial shoulder. Figure 14 shows the underside of the separate tread piece where the separation between the #2 and #3 belts had expanded to within about 2 inches of the serial side shoulder and to about 30 degrees along the nonserial shoulder.

Researched Tire Data:

There were no recalls applicable to the failed left front tire listed on the National Highway Traffic Safety Administration website.

Bridgestone product documents described the tire as a fuel efficient all-position truck tire for long haul and regional service with an original tread depth of 18/32nds of an inch.

Analysis:

The subject tire failed as the direct result of a localized separation between the #2 and #3 belts which initiated in the area of 315 degrees closer to the nonserial shoulder. The separation was present in the tire for many miles, based on the accelerated wear shown in Figures 11 and 12. The separation propagated until it had grown to extend along the nonserial shoulder from about 275 degrees to 30 degrees and across the crown of the tire to within a couple inches of the serial shoulder. As the separation grew, the weight of the separated tread and belts increased until the forces generated as the tire rotated were sufficient to tear the separated piece from the tire casing. Without the support of the tread and belt package, the radial casing cords spread and rapid air loss occurred.

There are numerous potential causes of a localized separation such as the one that led to the failure of this tire. Causes can range from manufacturing and design errors to road hazard damage or improper usage or maintenance of the tire. The tread and belt assembly adjacent to the localized separation probably was where the separation initiated and inspection of those components would greatly assist in determining the cause of the separation, for example a misplaced or improper component or a cut or break through the tread into the belt package. Unfortunately, that portion of the tire was not available for inspection; it was apparently not recovered or preserved, similar to the additional tread piece identified in John Scott's report. Without this portion of the tire, it is not possible to conclusively determine what initiated the localized separation that ultimately caused the failure of this tire.

Two new Bridgestone R283 tires were installed on the front axle of the truck on August 26, 2014. The right front tire reportedly failed from a tread separation on September 27, 2014. The subject left front tire then failed from a tread separation on October 8, 2014. The fact that both tires failed in the same manner, from a tread separation, supports a common cause, such as an impact with some road hazard like a curb, which would have affected both front tires. The vehicle orientation and other specific factors of the impact would have resulted in more damage and the earlier failure of the right front tire. The left front tire, though internally damaged, continued to operate until the separated area became large enough to tear from the tire.

In their reports, Brian Queiser, Joseph Grant and John Smith identified rim compression grooves as evidence of underinflated operation. However, the marks on the tire beads, Figures 2 and 4, lacked any significant depth and were simply impressions of the worn, eroded surface of the alloy rim flanges, the result of wear that occurred during the more than ½ million miles the rim had been used. The squared edges of the tread shoulder ribs, Figures 8 and 10, and the overall even treadwear, Figure 9, along with the lack of sidewall scuffing, Figures 1 and 3, or innerliner abrasions, Figures 5 and 6, indicated that the tire was not run overdeflected.

Conclusions:

The 295/75R22.5 Bridgestone R283 V Steel Rib Ecopia tire mounted on left front of the 2011 Freightliner tractor pulling two trailers driven by Brian Kehler failed when portions of the tread and steel belt package separated and ultimately detached from the tire casing. The tire failure was the result of a localized separation which initiated near the nonserial shoulder propagated until the separated portion tore from the casing and rapid air loss occurred.

The portion of the tread and belt package where the separation initiated was unavailable for inspection so the specific cause of the separation could not be conclusively determined, however, considering the previous tread separation failure of the right front tire, it is likely that both front tires were damaged by some road hazard impact.

The physical evidence indicated that the tire was not chronically operated while overdeflected.

Sincerely,

Kenneth L. Pearl

02645kp

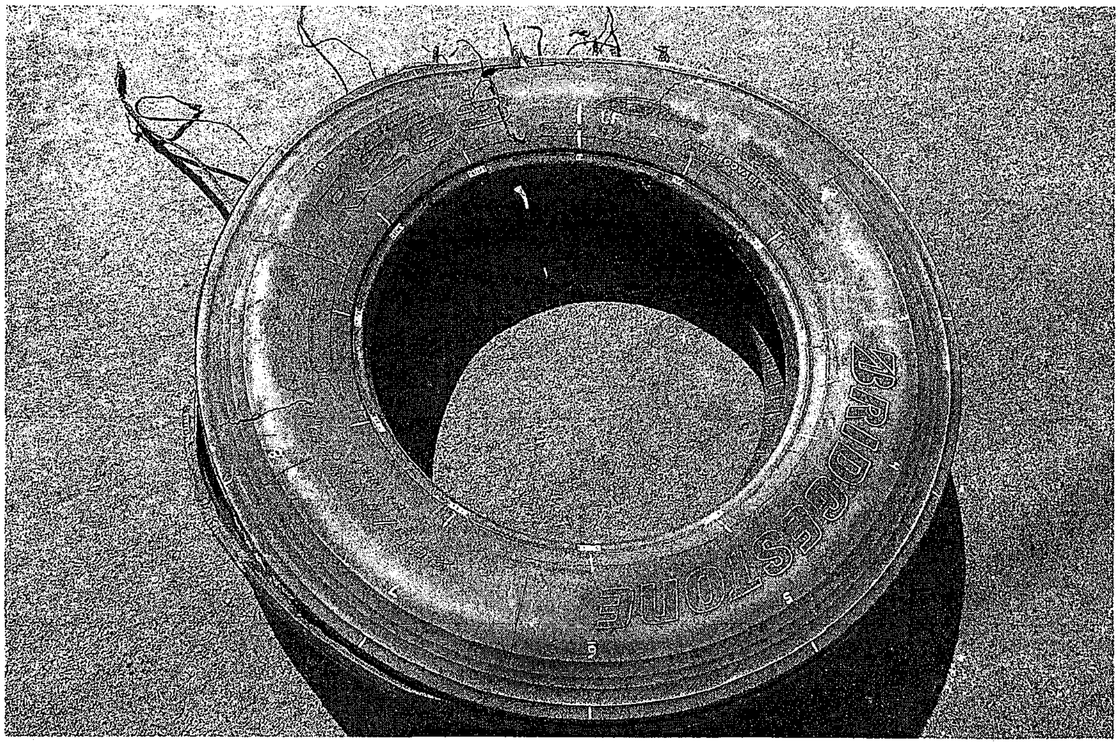

Figure 1

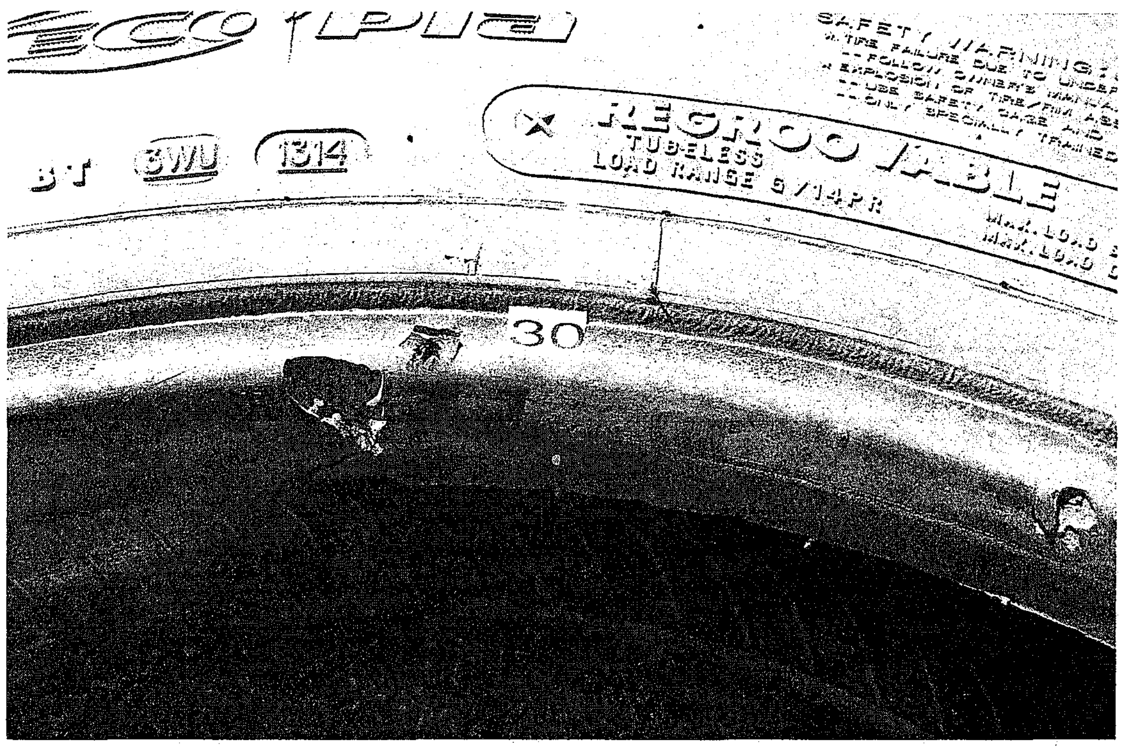

Figure 2

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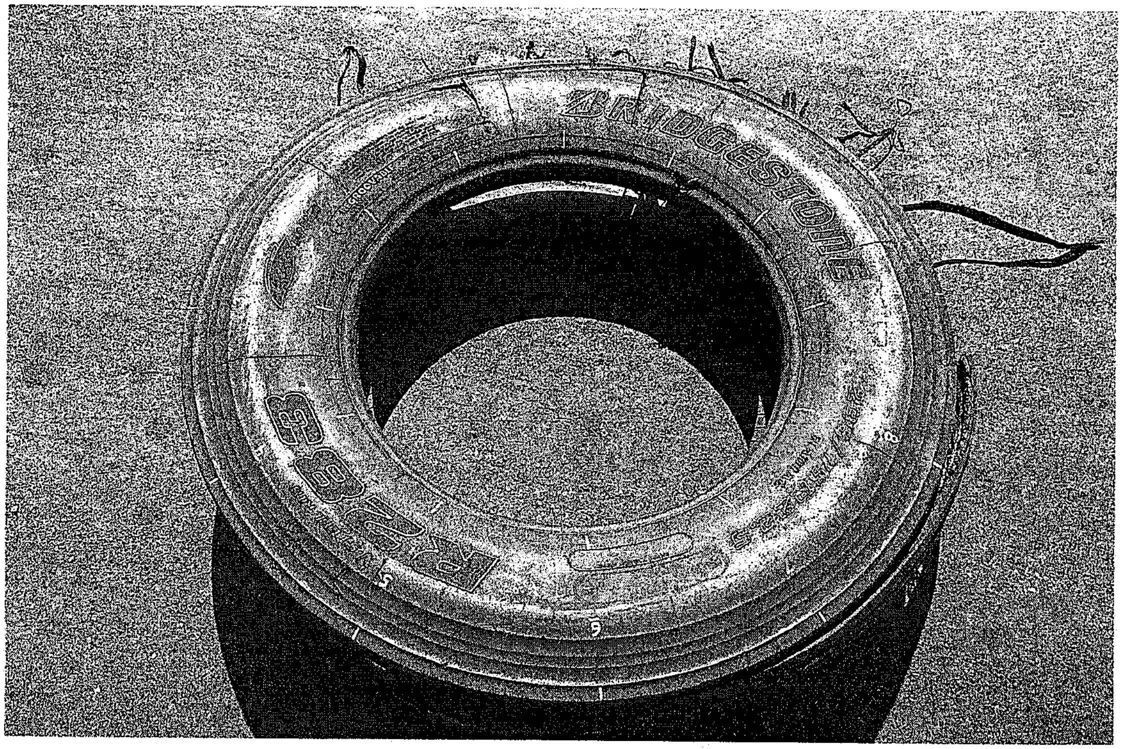

Figure 3

Figure 4

02645kp

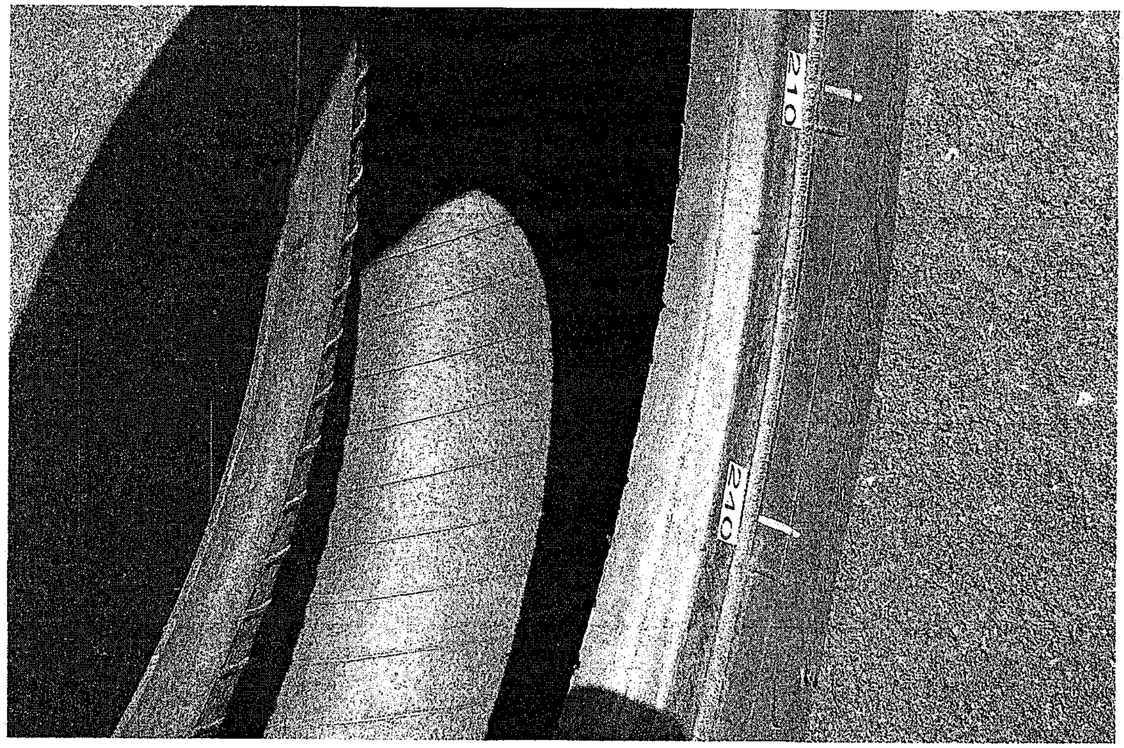

Figure 5

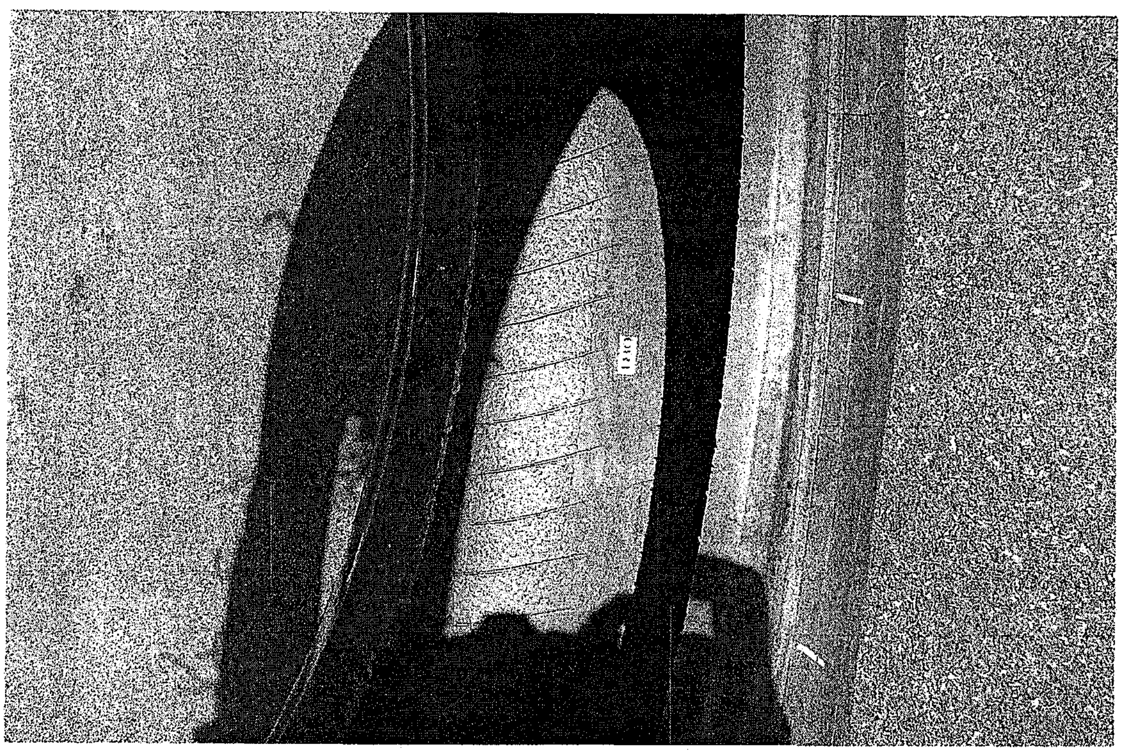

Figure 6

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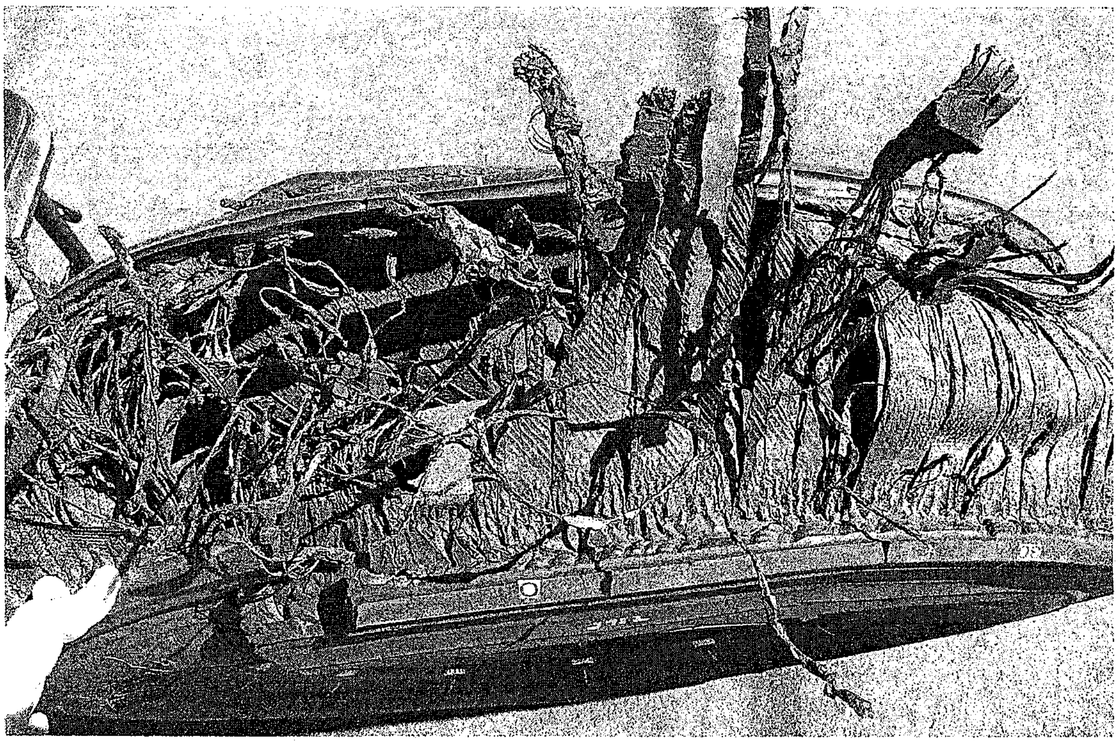

Figure 7

Figure 8

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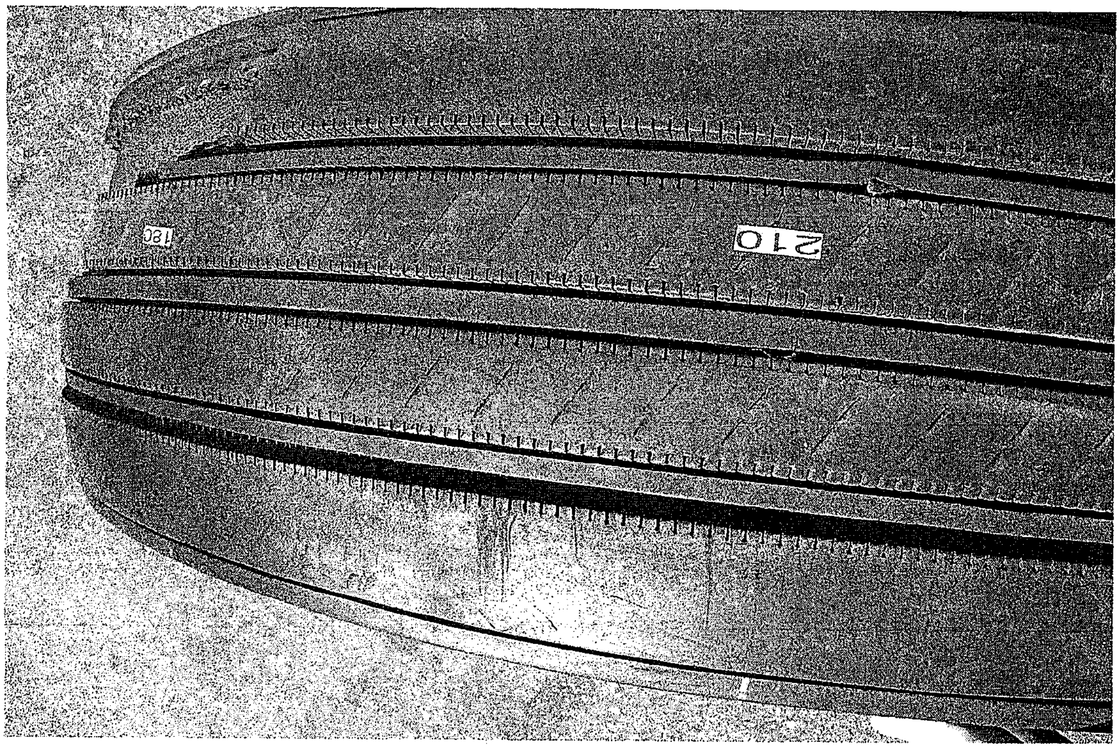

Figure 9

Figure 10

02645kp

Figure 11

Figure 12

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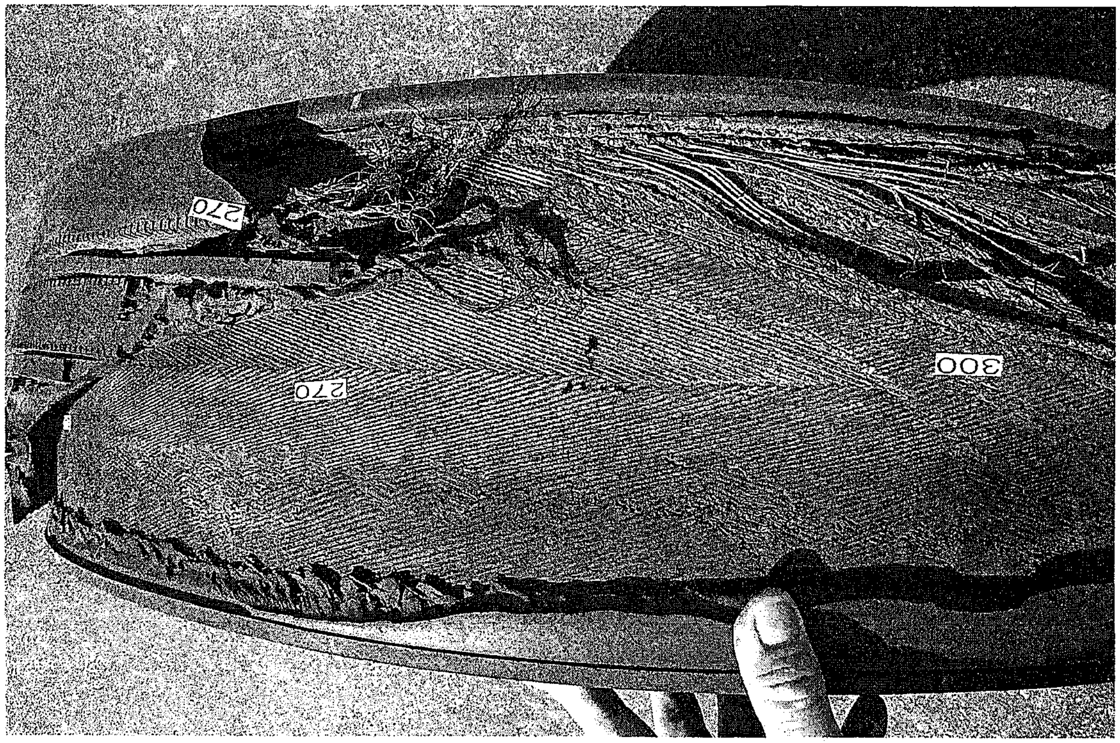


Figure 13

Figure 14

KENNETH L. PEARL, B.S.M.E.

Accident Reconstruction ***Tire Failure Analysis***
Automobile, Truck, Motorcycle, Bicycle, Pedestrian

Education:

University of Massachusetts
Bachelor of Science in Mechanical Engineering

Motorcycle Safety Foundation
Instructor Preparation Course - Nationally Certified Instructor
Experienced Rider Training Course

Various Seminars and Meetings

Professional Experience:

Independent Expert, (July 2000 to present). Accident Reconstruction including automobiles, trucks, motorcycles, bicycles, pedestrians, etc.; Tire Failure Analysis.

Staff Engineer, Vollmer-Gray Engineering Laboratories, (November 1989 to July 2000). Accident Reconstruction including automobiles, trucks, motorcycles, bicycles, pedestrians, etc.; Tire Failure Analysis.

Instructor, Motorcycle Training Center, (March 1991 to January 1992). Conducted motorcycle rider training courses meeting requirements of California Motorcyclist Safety Program and Motorcycle Safety Foundation.

Technical Manager, General Tire, (June 1988 to November 1989). Directed Tire Engineering, Compound Services, Quality Assurance and Tire Uniformity departments.

Uniformity Improvement Coordinator, General Tire, (June 1984 to June 1988). Coordinated all plant and corporate efforts for improving tire uniformity. Optimization of tire designs and manufacturing processes.

Senior Development Engineer, General Tire, (June 1982 to June 1984). Developed original equipment tires for General Motors meeting specifications for durability, ride and handling, traction, rolling resistance, noise, etc.

Development Engineer, General Tire, (July 1979 to June 1982). Tire design development programs for improved tire durability, standardization and cost reduction.

Motorcycle Mechanic, (1973 to 1978). Full service motorcycle mechanic during high school and college summers. Performed full range of repairs from scheduled maintenance to major overhauls.

Professional Affiliations:

Society of Automotive Engineers (SAE)
American Society of Mechanical Engineers (ASME)
American Motorcycle Association

22647 Ventura Boulevard, #341 , Woodland Hills, CA 91364
Telephone: (310) 200-7272 Fax: (818) 225-7279
e-mail: kenpearl@usa.net

KENNETH L. PEARL, B.S.M.E.

Accident Reconstruction — ***Tire Failure Analysis***

Automobile, Truck, Motorcycle, Bicycle, Pedestrian

FEE SCHEDULE

Consulting & Testimony	**$ 295 per hour** (no minimum)
Mileage*	**$ 0.60 per mile**
Photographic expense	**$ 1.00 per print**
Read and correct deposition	**One minute per page**

* Travel time is charged at normal consulting rate and is portal-to-portal.

Effective 1/1/2017

22647 Ventura Boulevard, #341, Woodland Hills, CA 91364
Telephone: (310) 200-7272 Fax: (818) 225-7279
e-mail: kenpearl@usa.net

Ken Pearl Testimonies

Date	Name	Deposition/Trial	Pltf/Def
4/8/2019	Starks v. ETI	Deposition	Def
4/3/2019	Godina v. Chacko	Deposition	Def
3/26/2019	CA v. Abraham	Trial	Def - C
3/21/2019	Anninos v. Miesen	Trial	Def
3/20/2019	Navarrete v. Delta Grinding	Deposition	Def
2/20/2019	Anninos v. Miesen	Deposition	Def
2/15/2019	DeGruy v. Botvinick	Deposition	Def
12/5/2018	Hamilton v. TBC	Deposition	Pltf
11/28/2018	Hamilton v. TBC	Deposition	Pltf
11/19/2018	Timoshuk v. Hertz	Deposition	Def
11/12/2018	Arevalo v. Gozman	Deposition	Def
10/19/2018	Esquival v. Aviles	Trial	Def
10/5/2018	Esquival v. Aviles	Deposition	Def
10/3/2018	Dizon v. Deng	Deposition	Def
9/13/2018	Genovese v. Big Boy Trucking	Deposition	Def
8/24/2018	Molina v. Boutros	Trial	Def
8/21/2018	Molina v. Boutros	Deposition	Def
5/8/2018	Bagwell v. Miller	Trial	Def
4/10/2018	Coleman v. Burns	Deposition	Def
2/28/2018	Bagwell v. Miller	Deposition	Def
2/13/2018	Gavidia v. Neiman	Trial	Def
12/20/2017	Gavidia v. Neiman	Deposition	Def
11/15/2017	Morales v. Israyelan	Deposition	Def
11/1/2017	Shi v. Bicycle Casino	Deposition	Def
9/15/2017	Jackson v Yokohama	Deposition	Def
9/14/2017	Salazar v. PNP	Deposition	Def
3/8/2017	Bagumyan v. Brandies	Trial	Def
2/22/2017	Bagumyan v. Brandies	Deposition	Def
1/10/2017	Ofori v. County of LA	Deposition	Def
10/6/2016	Sedacy v. Goldsmith	Deposition	Pltf
9/28/2016	Gutilla v. Golden Eagle Insurance	Deposition	Pltf
8/26/2016	Batta v. Ramos	Trial	Def
8/3/2016	Blas v. Magnuson Tire	Deposition	Def
7/27/2016	Iniguiz v. Carr	Deposition	Def
7/26/2016	LaVoie v. Wu	Deposition	Def
7/11/2016	McCoy v. Caltrans	Trial	Pltf
6/21/2016	Pebley v. Estrada	Trial	Pltf
5/27/2016	McCoy v. Caltrans	Deposition	Pltf
5/11/2016	Pebley v. Estrada	Deposition	Pltf
4/20/2016	Salazar v. Deighton	Trial	Def
4/6/2016	Mafucci v. Skiles	Deposition	Pltf
3/30/2016	Salazar v. Deighton	Deposition	Def
3/8/2016	Kim v. Devon	Deposition	Def
2/11/2016	Friton v. UIT	Trial	Def
1/25/2016	Gomez v. Romley	Trial	Def
1/21/2016	Friton v. UIT	Deposition	Def

Date	**Name**	**Deposition/Trial**	**Pltf/Def**
1/12/2016	Batta v. Ramos	Deposition	Def
11/10/2015	Spillane v. Capaccio	Deposition	Def
11/2/2015	Herrera-Hernandez v. Cortez	Deposition	Def
10/8/2015	Chaglasian v. Khoptar	Trial	Def
10/1/2015	Secci v. United Independent Taxi	Trial	Def
8/31/2015	Patrakis v. Ng	Deposition	Def
8/13/2015	Chaglasian v. Khoptar	Deposition	Def
8/11/2015	Gallagher v. Brown	Deposition	Def
8/3/2015	Vansoelen v. Maldur	Trial	Def
5/21/2015	Farahmand v. Ward	Deposition	Def
5/13/2015	Poole v. Cejoco	Deposition	Def
4/16/2015	Romero v. Romo	Trial	Pltf
4/10/2015	Ruby v. Grover	Deposition	Def

EXHIBIT C

JOSEPH L. GRANT
4201 MOSS CREEK COURT
MATTHEWS, NORTH CAROLINA 28105
PHONE 704 617 0336

April 26, 2019

Mr. Colin P. Smith
Holland & Knight, LLP
131 South Dearborn Street, Suite 3000
Chicago, Illinois 60603

Re: *Richard v. Bridgestone Americas Tire Operations, LLC, et al.*

Dear Mr. Smith:

I am an independent tire consultant and failure analyst of tires. I have a Bachelor of Science Degree in Mechanical Engineering from Fenn College of Engineering at Cleveland State University and graduated in 1971. I was employed as a tire engineer for more than 34 years by Continental Tire North America, Inc., previously known as The General Tire & Rubber Company and Continental General Tire, Inc. From September 1988 to January of 1993, I was the Director of Commercial Tire Technology, which included all-steel truck tires similar to the all-steel truck tire involved in this matter. As part of my tire technology responsibilities involving all-steel truck tires, I headed up a technical team involving tire engineers and chemists from the United States, Germany and Japan that was responsible for developing all-steel truck tires for a joint venture (GTY Tire Company) new truck tire manufacturing facility located in Mt. Vernon, Illinois. From 1993 until my retirement at the end of 2005, I was the Director of Product Analysis, where I was responsible for the failure analysis of tires manufactured by Continental Tire North America, Inc., and also analyzed other manufacturers' tires. During my career, I had responsibilities for the design, development, testing and the forensic analysis of tires. These responsibilities included design, development and testing of tires to ensure they complied with the performance requirements of the Department of Transportation and Continental Tire as well as various vehicle manufacturers.

I am also a member of the Society of Automotive Engineers, the American Chemical Society and the American Society of Mechanical Engineers and I have represented Continental Tire at the Rubber Manufacturers Association and Tire and Rim Association.

I have been engaged as an independent consultant in the field of tire failure analysis for over fifteen (15) years for a wide variety of clients. In this regard, I have presented expert opinion testimony in cases in both federal and state courts throughout the United States. I have qualified as an expert in the field of tire failure analysis in both State and Federal Courts in California, Texas, Arizona, Florida, Maryland, North Carolina, South Carolina, Mississippi, Missouri, Georgia, Nebraska, Idaho, New York, Pennsylvania, Tennessee, Louisiana, Iowa, Oklahoma, Minnesota, Montana, Illinois, Wyoming, New Mexico, Wisconsin and Virginia. I have never been found to be unqualified as an expert in the field of tire failure analysis by any court.

On September 10, 2015, in Akron, Ohio, I personally examined the left front tire at issue and its wheel and the companion right front tire. I have also reviewed various depositions and case specific materials.

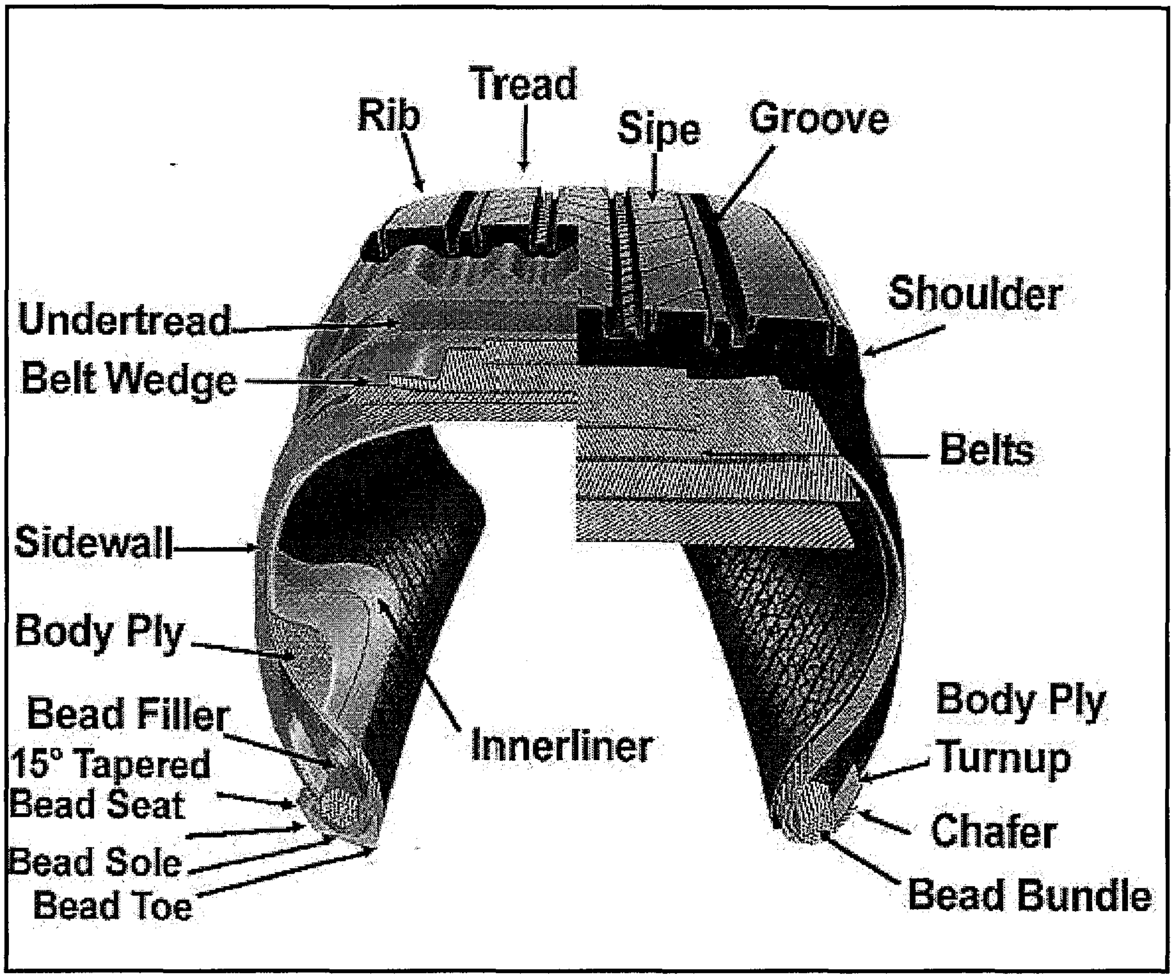
I am submitting this report pertaining to my findings, opinions and conclusions from my forensic examination of the tire at issue and its wheel, the companion tire and my review of various case-specific materials.

A. <u>RADIAL TRUCK TIRE DISCUSSION</u>

Radial truck tires such as the left front tire at issue and the companion tire are commonly referred to as all-steel radial truck tires. This is because the body ply reinforcement material as well as the belt reinforcement material are comprised of steel cords. The body or carcass ply is one (1) steel ply and the steel belts are typically comprised of four (4) steel belt ply layers. The inner steel belt layer closest to the steel body ply is commonly referred to as the number one (1) steel belt and is also called the transition belt. The next two (2) steel belts are the working belts and are commonly referred to as steel belts two (2) and three (3). The top steel belt that is closest to the tread is commonly referred to as the protector belt or the number four (4) steel belt.

An all-steel radial truck tire is a complex, laminate structure, typically containing twenty or more different components and a dozen or more different compounds. All-steel radial truck tires are designed to carry vehicle loads in a particular application under a wide variety of operating conditions.

All-steel radial truck tires have entirely different compounds and construction components compared to passenger and light truck tires in order to perform under high loads, high inflation pressure, severe service conditions, multiple retreads, high mileage and years of service. Because of the wide variety of vehicles and service conditions where all-steel truck tires are used, the compounds and constructions are optimized for the particular intended vehicles and service conditions such as for recreational vehicles.



<u>ALL-STEEL RADIAL TRUCK TIRE GENERIC CUTAWAY DIAGRAM</u>

From a tire manufacturing standpoint, all-steel radial truck tires are manufactured in different manufacturing plants or at least in segregated portions of tire plants. This is because the manufacturing equipment is extensively different compared to the equipment that is used to manufacture passenger and light truck tires. Even the curing of all-steel radial truck tires use significantly different temperatures, internal curing press pressures and much longer curing times compared to passenger and light truck tires.

Because of its complex nature, including that it is a pneumatic structure that requires compressed air, an all-steel radial truck tire can fail due to a wide variety of severe or abusive service-related conditions. Just because a tire fails or loses air does not mean a tire is defective.

B. BACKGROUND

According to the Wyoming Investigator's Crash Report, on November 8, 2014, at 2:55 pm, a 2011 Freightliner truck (VIN 1FUJGLDR6BSBA8406) driven by Brian Kehler, with co-driver Steven Marks as a passenger, was traveling westbound on Interstate 80 in Cheyenne, Laramie County, Wyoming. Around milepost 363.25, the driver's side steer tire blew out. The truck entered the eastbound lanes of travel and collided with a 2005 Chevrolet Venture (VIN 1GNDV23E25D138748) driven by Aaron Richards. The Chevrolet Venture continued eastbound for a short distance before coming to a stop facing westbound in the eastbound lanes. The Freightliner truck continued westbound in the eastbound lanes out of control and collided with a 2013 Dodge Caravan (VIN 2C4RDGCGXDR552095) in a partial head-on collision. The Freightliner truck and the Dodge Caravan came to a stop still locked together from the crash in the eastbound lanes. The speed limit at the time of the accident was 75 miles per hour.

C. EXAMINATIONS

LEFT FRONT TIRE AT ISSUE AND WHEEL

During my examination of the left front tire at issue and its wheel, I took seven (7) pages of inspection notes as well as one hundred sixty-two (162) digital photographs.

The left front tire at issue was identified by information molded on the sidewalls as follows:

BRIDGESTONE R283
295/75R22.5
LOAD RANGE: G, PR 14
MAXIMUM SINGLE LOAD: 6175 LBS @ 110 PSI COLD
MAXIMUM DUAL LOAD: 5675 LBS @ 110 PSI COLD
TUBELESS RADIAL
REGROOVABLE
TREAD: 5 PLY STEEL
SIDEWALL: 1 PLY STEEL
DOT: 2CBT3WU1314

The DOT number indicates that the left front tire was manufactured in the Morrison, Tennessee tire manufacturing facility during the 13th week of 2014.

The left front wheel was an ALCOA forged 22.5 X 8.25 inch wheel. The tire and wheel were separate for examination.

The left front tire had a majority of its tread and all four (4) steel belts detached. There was one (1) separate detached piece of tread with portions of all four (4) steel belts attached that was from the tire. There were also twenty-one (21) tires pieces that were not from the tire.

The average remaining tread groove depth was 12.5/32^{nds} of an inch. The tread hardness measured approximately 68 Shore A. There were a few stones in the tread grooves.

Using a clock face as an approximate locating reference system with the DOT serial number at 12:00, the tread and steel belts three (3) and four (4) were detached from 7:30 on the serial side and 9:30 on the opposite serial side to 4:15 on the serial side and 6:15 on the opposite serial side.

The tread and steel belts three (3) and four (4) were partially detached from 9:30 on the opposite serial side and 7:30 on the serial side back to 6:15 on the opposite serial side and 6:30 on the serial side. The 9:30 opposite serial side ends of steel belts three (3) and four (4) were loose, bare, bent and tangled back to approximately 9:00. The opposite serial side tread shoulder rib was detached and missing over the region. There were also gouges and tears on the opposite serial side intermediate tread rib in the 8:00 to 9:00 region.

The number two (2) steel belt was detached from 9:45 on the opposite serial side and 12:15 on the serial side to 12:45 on the opposite serial side and 3:15 on the serial side. The number two (2) steel belt was partially detached on the serial side from 12:15 back to 11:30.

The number one (1) steel belt was detached from 10:30 on the opposite serial side and 11:00 on the serial side to 1:15 on the opposite serial side and 1:45 on the serial side. The number one (1) steel belt was broken at 10:30 to 11:00, approximately five (5) inches long circumferentially in the crown region. There were an additional approximately seven (7) steel cords in the number one (1) steel belt broken at 1:15.

The number two (2) steel belt cords were broken approximately six (6) inches long circumferentially in the opposite serial side tread shoulder region from 10:00 to 10:45.

There were radial splits between steel carcass cords at 11:30 and 12:45. The radial splits extended under the serial side and the opposite serial side shoulder decoupler ribs and into the sidewalls. There were also steel carcass cords broken between the two (2) radial splits in the opposite serial side off shoulder region. The broken steel carcass cords extended from the opposite serial side shoulder to the serial side shoulder in bands and individual cords. The broken steel carcass cord ends were bent and tangled.

At 12:45 in the crown region, four (4) steel carcass cords were broken. At 11:45, steel carcass cords were broken approximately 1.1 inches wide under the opposite serial side tread shoulder rib location. The opposite serial side of the broken steel cords were missing.

There were two (2) steel carcass cords broken between 12:45 and 1:00.

Radial splits were located on the innerliner on the serial side at 3:15 and 4:15.

At 11:45, the serial side shoulder decoupler rib was split open. Also at 11:45, on the opposite serial side, there was a gouge and abrasion on the decoupler rib that extended onto the opposite serial side off shoulder to the circumferential split and broken steel carcass cords from 11:30 to 12:45.

Overall, the steel belt cords and the steel carcass cords were adhered in rubber.

There was multi-level rubber tearing on all of the detached surfaces.

A localized region of multi-level separation was present on top of the number two (2) steel belt in the 9:30 to 9:45 opposite serial side region that extended to the serial side tread shoulder groove region at 11:00 to 12:00. The localized region was along the 9:45 opposite serial side to 12:15 serial side number two (2) steel belt detachment line. Multi-level radial tear lines were present on the serial side from 10:45 to 12:45 on top of the number one (1) steel belt. The serial side multi-level radial tear lines extended to the larger localized opposite serial side region.

There was one separate detached piece of tread and various portions of all four (4) steel belts that fit the tire from 11:00 on the serial side and 1:00 on the opposite serial side to 1:00 on the serial side and 3:00 on the opposite serial side for the tread and steel belts three (3) and four (4). The number two (2) steel belt on the bottom of the number three (3) steel belt fit the tire from 11:30 on the opposite serial side and 12:30 on the opposite serial side to the number three (3) and four (4) steel belt detachment line in the 1:15 to 2:00 region. The number two (2) belt was broken along the detachment line and the serial side of the broken cords were missing. At 12:30 on the opposite serial side to 1:30 on the serial side, there was also an approximate 0.7 inch wide band of the number one (1) steel belt in the bottom of the detached piece.

The steel cords in steel belts one (1), two (2), three (3) and four (4) on the detached piece were adhered in rubber.

There was multi-level rubber tearing on the bottom of the detached piece. A localized region of multi-level separation was present on the bottom of the detached piece on the

bottom of the number three (3) steel belt following the 11:00 serial side to 1:00 opposite serials ide detachment line. There was also a small localized region in the 11:00 to 12:45 serial side region with multi-level radial tear lines.

There was evidence of heat damage on the components, particularly including extensive heat discoloration and bluing on the bottom of the detached tread piece.

There were rim line compression groves and erosion 360 degrees on both sides of the left front tire at issue.

The innerliner was sound. Abrasion on the innerliner was present in the 11:30 to 12:00 serial side sidewall region.

On the serial side sidewall, there were splits through the sidewall at 12:45, 8:15 and 11:30. At 11:45, there was also a split with abrasion extending to a circumferential break I the 11:30 to 12:00 region. At 12:30, there was a deep gouge on the serial side bead and at 10:30, there was a two (2) inch cut on the bead with surface cuts on the sidewall nearby.

On the opposite serial side sidewall, there were radial splits through the sidewall at 12:45 and at 11:30. The sidewall was also split open circumferentially with the steel carcass cords broken and innerliner broken in the off shoulder region from 11:30 back to 12:45. There was also abrasion on the innerliner along the break and a portion of the innerliner was detached and abraded in the region. Additionally, abrasion was visible on the opposite serial side sidewall near the 12:45 radial split.

At 11:45, on the opposite serial side off shoulder region, there was abrasion that extended onto the tread surface.

At 12:00, in the opposite serial side bead region, the bead toe was torn open approximately 1.5 inches wide exposing the steel. There was also abrasion in the region. At 1o:45, the opposite serial side bead was snag that exposed chafer material and broken steel cords.

There were no manufacturing anomalies in the left front tire that could have caused or contributed to the failure of the tire.

There were no wheel weights on the left front wheel. There were eroded and worn wheel flanges with bends. There were also abrasions on both wheel flanges with more abrasion on the outboard flange. Additionally, the wheel was covered with a black material with a brown material underneath.

RIGHT FRONT COMPANION TIRE

During my examination of the right front companion tire, I took four (4) pages of inspection notes as well as thirty-two (32) digital photographs.

The right front companion tire at issue was identified by information molded on the sidewalls as follows:

CONTINENTAL HS L2
275/80R22.5
LOAD RANGE: G
MAXIMUM SINGLE LOAD: 6175 LBS @ 110 PSI COLD
MAXIMUM DUAL LOAD: 5675 LBS @ 110 PSI COLD
TUBELESS RADIAL
REGROOVABLE
TREAD: 5 PLY STEEL
SIDEWALL: 1 PLY STEEL
DOT: A3DF1YJ4911

The DOT number indicates that the right front companion tire was manufactured in the Mt. Vernon, Illinois tire manufacturing facility during the 49^{th} week of 2011.

There was no rim available for examination. The opposite serial side of the tire was marked "OUTBOARD".

The average remaining tread groove depth was $11.5/32^{nds}$ of an inch. The tread hardness measured 68 Shore A.

There was serial side tread shoulder abrasion 360 degrees. Additionally, there was localized deep lateral abrasion on the tread in the 6:00 to 7:00 region.

Localized erosion tread wear was present on the opposite serial side of the tread shoulder groove and rib in the 12:00 to 2:00 region and 10:00 to 11:30 region.

From 2:30 to 4:00, a deep narrow cut was present on the opposite serial side intermediate tread rib and at 9:15, there was a 0.1 inch diameter deep puncture with rounded edges also on the opposite serial side intermediate tread rib. The puncture did not extend through the innerliner.

There were rim line compression groves and erosion 360 degrees on both sides of the right front companion tire.

The innerliner was sound.

I was also provided with eighteen (18) photographs of the right front companion wheel taken by John Smith. Those photographs show that the flanges on both sides of the right front wheel were eroded and worn.

D. TIRE CARE AND MAINTENANCE

Among other materials, I have reviewed the available maintenance records related to the tractor and its tires, the GPS and EDR data related to the speed of the vehicle and, among others, the depositions of Chris Rodwick, Brian Kehler, Steven Marks, Ryan Mower and Robin Wright. These materials provided information on the purchase and maintenance history of the Bridgestone R283 Ecopia steer tires used on the tractor, the expectations and training provided by FedEx Ground and CLR with respect to tire issues, and the attention and care taken by the operators of the tractor with respect to tire issues.

A number of significant items of information, including but not limited to the following, were derived from these materials:

1. The left front tire at issue was driven over 52,000 miles prior to the accident;

2. Kehler and Marks contradicted one another about inflation maintenance on the steer tires, rendering inconsistent testimony about both frequency and method of inflation pressure checks. Kehler, the lead driver, clearly testified that inflation checks with a gauge were infrequent -- possibly at intervals as long as three weeks to a month. Otherwise, tire checks were generally done only by the unreliable method of "thumping" tires with a "beater." The maintenance records corroborated the inadequacy of this method, showing low pressures when checked by third parties.

3. Both Kehler and Marks failed to even target the specified placard pressure of 110 psi for the vehicle. Both aimed at lower numbers, which would only be exacerbated by the improper inflation checking.

4. Mr. Rodwick was aware of tire speed restrictions, believed the subject tire was speed restricted to 75 mph, and specifically testified that he had advised his drivers never to exceed the speed limit and never to exceed 75 mph as a maximum. Kehler admitted to being aware of tire speed restrictions or ratings, but apparently made no effort to determine or respect them with respect to the Bridgestone R283 Ecopia tires in the steer positions. Similarly, Kehler and Marks both testified they were not aware of Rodwick's maximum speed admonition, and expressly admitted they often targeted higher speeds through the cruise control feature of the vehicle.

5. The GPS and EDR data provided, while limited in scope, clearly shows that the vehicle was frequently driven over the speed restriction of the tire and often for extended periods. These included numerous occasions on which the vehicle was driven at speeds at or over 80 mph.

6. There is no indication of significant substantive training and supervision provided to drivers by FedEx and CLR related to tire maintenance and safety issues.

E. <u>CONCLUSIONS</u>

Based upon my education, training, experience, and examination of the left front tire at issue and wheel, the companion tire and a review of the materials provided to date, I have reached the following conclusions:

1) The design of the left front tire is not defective or unreasonably dangerous. The design of the tire is consistent with those generally used in the tire industry for this application at the time it was manufactured. The tire did not contain any manufacturing condition or defect that would have been a cause of the tire failure.

2) The subject tire was reasonably and appropriately designed, manufactured, tested, stamped and labeled, and complied with applicable federal regulations and industry standards governing tires, including Federal Motor Vehicle Safety Standard 119. The stated purpose of these regulations is to protect the public against unreasonable risk of accidents involving motor vehicles or motor vehicle equipment including tires. These safety regulations include both performance and tire identification or labeling standards.

   The 2005 NHTSA publication "The Pneumatic Tire", Chapter 15 states that "because the major tire manufacturers have been in business for decades and have extensive research, design, development, manufacturing and quality control activities and procedures - and employ thousands of specially trained scientists, engineers and production personnel - design and manufacturing defects are extremely rare".

3) The left front tire at issue experienced a detachment of a majority of the tread and all four (4) steel belts. This condition alone does not mean the left front tire is defective. Tread and steel belt detachments occur for a variety of reasons with the vast majority of tread and steel belt detachments (full and partial) occurring as a result of damage from in-service abuse such as overdeflected operation,

cuts, punctures, improperly repaired punctures, wear into the belt structure and/or road hazard impact injuries.

The 2011 "Radial Tire Conditions Analysis Guide" was published by the Technology & Maintenance Council of the American Trucking Associations, Inc. This guide is specifically for truck tires such as the tire at issue. This guide states that the probable cause of a section of tread with loose exposed, frayed wires or pieces of tire, usually found along the side of the road, is heat buildup, resulting from operating with insufficient inflation pressure to carry the load. The guide also recommends performing frequent air pressure checks and pre-trip inspections. This guide also states that road hazards may result in loss of air and/or separation. To minimize road hazards, the guide recommends eliminating yard debris, review pre-trip inspection procedures, and review operating environment.

There is also a brochure titled "Bring it Home Safely...How You Can Prevent Underinflated Truck Tires", also published by The Maintenance Council of the American Trucking Association. This brochure discusses the importance of proper inflation pressure and inflation pressure maintenance to help prevent tread and steel belt detachments.

4) The left front tire at issue experienced a detachment of a majority of the tread and all four (4) steel belts as a result of overdeflected operation and speed. Overdeflected operation is caused by overloading, underinflation or a combination of both. Additionally, excessive speed contributed to the deterioration of the tire resulting in the detachment of a majority of the tread and all four (4) steel belts.

5) The physical evidence on the left front tire and wheel consistent with overdeflected operation includes:

   a) the rim line compression grooves and erosion on both sides of the tire;
   b) the belt separation between steel belts two (2) and three (3);
   c) the lack of any manufacturing or design defect in the left front tire;
   d) the eroded and worn flanges on both sides of the left front wheel;
   e) the heat discoloration and bluing on the bottom of the detached tread piece.

   As discussed in conclusion 3 above, the 2011 "Radial Tire Conditions Analysis Guide" published by the Technology & Maintenance Council of the American Trucking Associations, Inc. This guide states that the probable cause of a section of tread with loose exposed, frayed wires or pieces of tire, usually found along the side of the road is heat buildup, resulting from operating with

insufficient inflation pressure to carry the load. The guide also recommends performing frequent air pressure checks and pre-trip inspections. This same digest states that two of the probable causes of damage to the rim flange on aluminum wheels and associated bead damage including cracking are low air pressure and overloading.

I gave a presentation at the September 2004 International Tire Exposition and Conference (ITEC) pertaining to rim line compression grooves. The title of the presentation was "Rim Line Compression Grooves as an Indication of Underinflated or Overloaded Tire Operation in Radial Tires". This conference is held every two years and is one of the premier seminars for presentations and peer review of scientific tire-related research. My paper and others at the ITEC were presented to a broad spectrum of tire industry people, including tire engineers and tire chemists. The paper illustrates rim line compression grooves as a result of controlled evaluations. The paper also studied how overdeflected operation in combination with speed can increase the operating temperature of a tire especially at the belt edges.

Standards Testing Laboratories has also conducted and published three (3) research papers in 1997 and 1998 that support the technical position that rim line compression grooves develop primarily as a result of overdeflected operation. Additionally, the 2001 Northwestern Traffic Investigation Manual, Chapter 8, also discusses rim grooves as an indicator of overdeflected operation.

Rim line compression grooves are an indication of the cumulative overdeflected operation history of a tire. Overdeflected operation increases the operating temperature of the tire. Overdeflected operation, depending on the length of time and overall service conditions such as speeds to which the tire is subjected, can damage the tire, including degrading the physical properties of the rubber compounds and reducing a tire's resistance to separation especially at the belt edges.

6) The operators of the vehicle did not act reasonably or meet the standard of care with respect to tire inflation maintenance. Per the depositions and various discovery materials, there was not a proper regular practice of checking the inflation pressure of the tires with a gauge at regular intervals. Additionally, the vehicle placard inflation pressure of 110 psi for the steer axle tires was not being followed. A proper routine checking of the inflation pressure of the steer axles tire would include insuring the pressures were set to the 110 psi placard recommended inflation pressure with the use of an accurate air pressure gauge. Visual inspection of the tires to check for a low pressure tire and/or thumping a tire are not an appropriate way to insure the tires are properly inflated.

The basic design and function of tires, including that they are pneumatic devices, rely on compressed air to provide their designed load carrying capacity. The Tire and Rim Association load and inflation tables that specify the maximum load carrying capacity for each size tire are based on the volume and pounds per square inch of compressed air inside each tire. If the inflation pressure is inside a tire is set and/or maintained below the recommended operating inflation pressure, the corresponding load carrying capacity is reduced. The tire operates hotter and the tire has to work harder than a properly set and maintained operating pressure. The stresses and strains in the tire overall increase especially at the steel belt edges. Following the vehicle tire placard or owner's manual to ensure proper inflation pressure is used for the load being carried per each tire on the vehicle is required to ensure overdeflection does not occur. Additionally, as demonstrated in various technical papers, when a tire is operated underinflated, the operating temperature as well as the stresses and strains at the belt edges increases. Ref, "The Pneumatic Tire", edited by A. N. Gent and J. D. Walter, Published 2005 by NHTSA and "The Effect of Underinflation on Tire Operating Temperature", Jenny Paige, ITEC 2012.

This improper inflation maintenance was a cause of the failure of the left front tire.

7) The operators of the vehicle did not act reasonably or meet the standard of care with respect to the speed at which the left front tire was operated. The speed capability of the left front tire at issue was 75 miles per hour. All commercial truck tires have a speed restriction, and this is commonly known among truck operators and those responsible for truck tire maintenance. This has been a requirement of truck tires extending back decades to bias ply truck tires. The heavy load requirements of truck tires require a speed limit to insure truck tires are not run excessively hot and can perform satisfactorily. This is also common knowledge in the trucking industry. The vehicle involved in this matter was routinely operated above 75 miles per hour, including times in excess of 85 miles per hour. These failures contributed to causing the tire failure.

8) Overdeflection and speed individually and in combination cause a tire to run hot and cause tire disablement such as occurred in this matter.

9) Fedex Ground and CLR, as entities with ultimate responsibility for the safety and maintenance of the tires on the vehicle, failed to act appropriately and failed to meet the standard of care for companies operating over-the-road trucks by failing to provide appropriate training and supervision for their drivers with respect to these issues. The absence of an appropriate program directly caused and contributed to the failure of Kehler and Marks to appropriately monitor tire

inflation pressures and observe the speed restriction of the tire. These failures caused and contributed to the failure of the tire.

10) The left front tire also exhibits road hazard impact damage that contributed to the failure of the tire, which was already significantly damaged and weakened from overdeflected operation and excessive speed.

11) The left front tire at issue was not in a defective condition or unreasonably dangerous at the time it left Bridgestone's hands. The left front tire underwent a substantial change in its condition after it left Bridgestone. The left front tire at issue in this case failed because the tire suffered a combination of the service conditions and abuses that changed its condition substantially after it left Bridgestone.

12) The multi-level tearing and rubber tear appearance of the exposed detached surfaces of the steel belt skim and steel carcass skim rubber are evidence that the overall rubber to rubber and rubber to steel adhesion levels as well as the fatigue resistance, age resistance and physical properties, such as rubber strength and tear strength of the belt skim compound, were appropriate in the subject tire. The multi-level tearing of the rubber between the steel belts is also evidence that there was good balanced adhesion between all the various interfaces of the laminate structure. There is no physical evidence of any inadequate bonding or adhesion deficiency or premature aging of the belt skims in the subject tire. There is no evidence of insufficient antidegradents either by design or through manufacturing exceptions to counteract the degree of oxygen attack. This is based on the physical evidence on the tire. The steel cords overall are encased in rubber with the exception of a localized region in the top and bottom steel where the tire became disabled. The tire randomly tore apart in a multi-level way indicating good balanced adhesion and appropriate physical properties of the rubber. References: "Component Interfacial Tearing Appearances" by Gary Bolden and TIA 2005 - "Passenger & Light Truck Tires Conditions Manual".

13) The innerliner is not defective in the left front tire and in my experience is in line with well manufactured radial truck tires sold and used in the United States over the years. The left front tire does not have any exposed or penetrating body ply fabric. The innerliner including the innerliner thickness did not cause or contribute to the failure of the left front tire at issue.

14) Increasing rubber gauges of components such as increasing the innerliner gauge does not necessarily improve tire durability. Unnecessary increases in rubber gauges can actually reduce component and overall tire life. Unnecessary

increases in rubber gauges of rubber components increase tire weight, increase tire operating temperature and can increase the stresses and strains in the tire. The design approach to tires is to optimize each component in the tire to obtain the required tire performance.

15) There was nothing unusual about the steel belts in the subject tire that would be of concern related to tire durability. Based on my examination of the subject tire the steel belts were in line with well-manufactured tires and did not cause any tire durability issue in the left front tire.

I have also analyzed belt cord conditions on a large number of tires in my career, including tires manufactured by a variety of tire manufacturers in both new tires and worn tires. Additionally, on September 18, 2012, at the 2012 International Tire Exposition and Conference "ITEC", in Cleveland, Ohio, I presented a paper pertaining to an X-ray study of sixty (60) worn out passenger and light truck tires that I conducted. This study confirms that the belt conditions in the subject tire and the companion tires are normal and are not a concern related to durability. Additional technical papers that support this include: "Belt Misalignments and Belt/Belt Tear Patterns" ITEC 2002 and "The Effect of Snaked Belt Anomalies on Tire Durability" ITEC 2000 both by Harold J. Herzlich of Herzlich Consulting, Inc.

16) The left front tire at issue should not have been in service on the day of the accident. The persons responsible for maintaining and inspecting the left front tire at issue, including the driver, should have taken remedial action and removed the tire at issue from service before the accident. The area over the localized region where the tire failed would have appeared distorted. An increase in noise and vibration from the tire leading up to the tire failure would also have been signals to most drivers that the tire needed to be replaced. Additionally, there was irregular erosion or river wear that would warrant removing the tire from service.

17) At the time of the accident, the right front tire was a different size compared to the left front tire. Different size tires should not be mixed on the same axle. This should be common knowledge among truck operators, and was definitely known by Mr. Marks according to his testimony. This is another indication of improper tire maintenance and a lack of due care for tire safety.

18) In my experience, the forces generated on a vehicle from a tire failure do not normally adversely affect the dynamics of the vehicle or cause loss of control. If a loss of control does occur, it is typically related to other factors. I have instrumented many vehicles including a semi-tractor trailer during my career

and measured the forces going into a vehicle during various types of tire disablements at highway speeds, including tread and top steel belt detachments such as encountered in this accident. According to the 2005 NHTSA publication "The Pneumatic Tire", Chapter 15, the statistics indicate that only a fraction of the time, 0.06% to 0.50%, does an in-service tire failure end up with some type of crash.

This report is based upon a reasonable degree of engineering certainty, my education and work experience and on the materials presently available to me. I reserve the right to supplement or amend this report in light of newly-acquired information.

I have enclosed a copy of my current CV which includes publications, my deposition and trial testimony list, a list of case specific file materials and a list of general reference file materials. My hourly billing rate is currently $375 per hour as of September 1, 2018.

If you have any questions regarding my examination or opinions, please contact me.

Joseph L. Grant

Joseph L. Grant

CURRICULUM VITAE OF
JOSEPH L. GRANT

PRESENT EMPLOYMENT:	Independent Tire Analyst
HOME ADDRESS:	4201 Moss Creek Court Matthews, North Carolina 28105 Phone 704 617 0336
EDUCATION:	Bachelor of Science in Mechanical Engineering – June, 1971 Fenn College of Engineering, Cleveland State University
COURSES & SEMINARS:	• Tire Society Symposium • Akron Rubber Group • Clemson University Tire Industry Conference (October, 1985 and 1986) • Monsanto Rubber Technology Seminar (May, 1989) • SAE Motor Vehicle Accident Reconstruction and Cause Analysis (March, 1993) • International Tire Exposition and Conference • Northwestern University Traffic Institute Accident Investigation (March, 1997) • STL Trans Tech Tire Technology Seminar – 1999
PROFESSIONAL ORGANIZATIONS:	• Society of Automotive Engineers • Akron Rubber Group • Rubber Manufacturers' Association Chairman - Truck Bus Tire Engineering Committee (1986-1992) • Tire & Rim Association • The Maintenance Council of the American Trucking Association • American Society of Mechanical Engineers • Tire Industry Association ▪ American Chemical Society ▪ The Tire Society
PUBLICATIONS:	1) *"What makes a High Performance Tire Different than a Regular Tire"* Jan. 1986 - Akron Rubber Group Oct. 1986 - Clemson University Tire Industry Conference April 1987 - American Retreading Association *2) "Rim Line Grooves as an Indicator of Underinflated or Overloaded Tire Operation in Radial Tires"* September 2004 – ITEC *3) "X-Ray Study of Sixty (60) Worn Out Passenger & Light Truck Tires"* September 2012 – ITEC 4) *"Typical Manufacturing Conditions in Steel Belted Radial Tires: Do They Influence Tire Durability" September 2016 - ITEC* Also Published – 2017 Tire Technology International Annual
PATENTS:	Method of Forming Belted Radial Tires from a Cylindrical Tire Band (1977)

CURRICULUM VITAE OF
JOSEPH L. GRANT

EMPLOYMENT:	· June 1971 – Dec. 1994	The General Tire & Rubber Company
	· Jan., 1995 – April 2000	Continental General Tire, Inc.
	· May 2000 – Dec. 2005	Continental Tire, North America, Inc.
	· Jan. 2006 – Present	Independent Tire Analyst

POSITIONS:

• June, 1971	Engineering Trainee, Tire Technology Department, Akron Tire Manufacturing Plant (Akron, Ohio).
• October, 1972	Project Engineer, Advanced Tire Development. Responsible for the Development of Advanced Concept Tire Products, including Fiberglass Belted Radial Passenger Tires and Advanced Bias Truck Tires (Akron, Ohio).
• October, 1978	Manager, Bias Passenger Car Tire Engineering Technology. Responsible for the Engineering Development Group for Bias Passenger Tires (Akron, Ohio)
• April, 1980	Manager, Replacement and Private Brand Passenger Car Tire Engineering Technology. Responsible for the Engineering Development Group for Bias and Radial Passenger Tires (Akron, Ohio).
• March, 1987	Section Manager, Radial Truck Tire Engineering. Responsible for the Engineering (Construction and Mold Design) Development Group for Radial Truck Tires (Akron, Ohio).
• September, 1988	Director, Commercial Tire Technology. Responsible for the Engineering (Construction and Mold Design) and Compound Development Groups for Commercial Products, including Bias and Radial Medium and Heavy Service Truck Tires and Giant, Farm and Industrial Tires (Akron, Ohio, September 1988 - March 1992) (Mt. Vernon, Illinois, April 1992 - December 1992).
• January, 1993	Director, Product Analysis. Responsible as company-wide consultant to assist other Departments on the subject of Tire Failure Analysis, Tire Performance Standards, and Safety Literature (Akron, Ohio, January 1993 - October, 1995) (Charlotte, North Carolina, November 1995 – January 2006).
• January, 2006	Independent Tire Analyst

EXHIBIT D

Bridgestone Americas, Inc.

10 East Firestone Boulevard
Akron, Ohio 44317 USA

Brian J. Queiser
Director, Product Analysis

April 26, 2019

REPORT

AARON RICHARD vs. BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC., et al.

The subject matter concerns a motor vehicle crash that occurred on or about November 8, 2014, involving a 2011 Freightliner truck tractor with two trailers. While reportedly traveling westbound on I-80 at/near milepost 363 in Cheyenne, Wyoming, the left front tire of the steer axle became disabled and the driver lost control of the vehicle. The tractor-trailer traveled off the roadway into the median, through a cable divider, and into the eastbound lanes of the interstate where it struck two oncoming passenger vehicles. One of those vehicles was driven by Aaron Richard.

I have been asked to review the facts and circumstances of the subject crash and to examine the allegedly failed left front tire and other tire/wheel components. In addition, it is my understanding that I may be asked to offer expert testimony in this matter related to the design, development, specification, manufacture, testing, application, performance, use, maintenance and monitoring of truck/bus tires—particularly Bridgestone V-Steel Rib R283 tires in size 295/75R22.5 Load Range G (14 Ply Rating)—manufactured by Bridgestone Americas Tire Operations, LLC ("BATO").

This report contains opinions and conclusions based on my education, experience, research and investigation to date regarding the subject matter. All of my conclusions and opinions are held to a reasonable degree of scientific certainty. As

any additional information may become available, I reserve the opportunity to supplement or amend this report.

Qualifications and Background

I hold a Bachelor of Science degree in Aeronautical and Astronautical Engineering from Purdue University and a Master of Science degree in Engineering Mechanics from The Ohio State University. Since January 1994, I have been continuously employed in Akron, Ohio by Bridgestone/Firestone, Inc. and now Bridgestone Americas, Inc.

My first assignment was within the Advanced Tire Technology Division, which encompasses the leading edge tire and test technology of the company. In August 1995, I transferred to the Passenger and Light Truck Tire Development Division, where tires are developed for sale to vehicle manufacturers as original equipment and for sale to consumers at retail outlets. In March 2001, I joined the Product Analysis Department, an independent group within the company that consults on subjects including tire failure analysis, vehicle crash reconstruction, tire performance standards, specifications, safety literature, and risk prevention.

I have personally developed steel belted radial tires from concept through prototype development and testing, final engineering approval, and ultimately to production. The development process is rigorous, involving advanced engineering design tools such as computer aided modeling, prototyping, and extensive testing. My duties have also included requesting, performing, and evaluating the results of thousands of tire tests, conducted both within the laboratory on specialized tire testing equipment and carried out at test tracks on vehicles. My testing experience includes traction and handling tests in wet, dry and winter/snow conditions.

As a result of my job responsibilities and years of experience, I have acquired detailed knowledge of tire engineering, including tire design, development, construction, materials, specifications, testing, performance, and usage. I have additional expertise in tire manufacturing, quality control, and field performance evaluation processes and techniques and broad knowledge of tires designed, manufactured, and distributed in the global tire industry. I regularly consult to various divisions within BATO and their worldwide affiliates and to external industry associations on subjects related to tire design, manufacturing, application, performance, repair, retreading, failure, warnings, and safety.

My extensive training and experience include performing failure analyses on failed or damaged tires from the field and those that were subject to testing. I have also

performed crash investigation and tire failure analyses for external entities, including law enforcement and government agencies, such as the National Transportation Safety Board (NTSB).

Attached to this report in Appendix A is my curriculum vitae and a list of testimony I have given in at least the last four years.

Tire Designs in General

BATO designs and manufactures tires for a large number of vehicles and applications including passenger cars, light trucks, commercial trucks, agricultural vehicles, mining vehicles, and more. These vehicles, and their numerous variations, have different physical characteristics, functions, operating environments, and expectations for performance and, therefore, require different types of tires.

Truck/bus tires are integral components of the commercial trucking and busing industries, which are themselves essential to the functioning of the economy and the welfare of the population in the United States. Trucks move virtually everything needed or used by consumers and businesses, from food to fuel, and of course buses transport people in and between cities and take children to and from school. Tires, whether original or retreaded, are vital to the safety and value of those functions, and enable or provide additional benefits in capability, comfort, convenience, and efficiency in doing so.

Tire design and construction are dictated by the job that the tire is meant to do. Differences among the design parameters are what make individual tires unique from others and can impact everything from their traction characteristics to their durability properties. These differences exist not only for the numerous tires used for different classes of vehicles, but also for different tires developed for vehicles within a given class. For example, some vehicles have different steering geometry and different load distributions than others, and their tires must be designed to take those differences into account. Accordingly, tires for certain uses are designed and built much differently than tires for other uses, with variations in the layers ("plies") of material and the type, weight, thickness, density, and/or stiffness of the materials in their major structural components (e.g., treads, sidewalls, body plies, etc.).

While it is difficult to fully categorize all tires, truck/bus tires can be sorted based on their size designation standards such as the following:

- Bias or Diagonal (designated by a "-" or "D" in the size code)

- Radial (designated by an "R" in the size code)
- Conventional (e.g. 11R22.5)
- Metric (e.g. 315/80R22.5)

Truck/bus tires may be further classified based on general design criteria, tire market segments, and vehicle requirements such as the following:

- All-Position, Steer, Drive, Tag, and Trailer Axle
- Local, Regional, and Long Haul
- On-, Off-, and On/Off-Highway

Thus, each size and type of tire is engineered for the specific performance characteristics required for its particular application. A steer axle tire for a long-haul motorcoach, for example, typically requires different components of different sizes and materials than a steer axle tire for a city bus due to differences in the vehicles and service conditions, even though both are considered a "bus." Such tire design differences may be due to different requirements and expectations for a multitude of performance parameters such as steering response, traction, ride comfort, and tread wear.

Tire companies typically design their truck/bus tires in accordance with guidelines issued by tire industry standards organizations around the world, including the Tire and Rim Association, Inc. ("TRA") of the United States, the European Tyre and Rim Technical Organisation ("ETRTO") of Belgium, and the Japan Automotive Tyre Manufacturers Association, Inc. ("JATMA") of Japan. Among other standards, these industry organizations prescribe such things as tire dimensions, load capacity, inflation pressures, and acceptable rim fitments in order to promote tire, rim/wheel, and vehicle application compatibility. The National Highway Transportation Safety Administration ("NHTSA") of the U.S. Department of Transportation ("DOT") recognizes these various organizations as well (see 49 CFR §571.119). Which industry standards are utilized by a tire manufacturer depends upon the specific tire design criteria, including internal and external customer requirements.

Truck/bus tires are designed in hundreds of different sizes and construction types for wheel diameter codes typically ranging from 17.5 to 25 inches. Truck/bus tires typically use inflation pressures ranging from 85 to 130 pounds per square inch ("psi"). This wide variety is required to satisfy numerous truck and bus applications and service conditions, in particular to meet the performance demands and differences between the axles on the vehicle.

Tire manufacturers also design, test, and certify truck/bus tires to different standards and performance criteria established by independent organizations such

as the Society of Automotive Engineers (SAE International, "SAE"), American Society for Testing and Materials (ASTM International, "ASTM"), and the International Organization for Standardization ("ISO"). Such organizations promulgate various standards for tire performance attributes such as durability, speed capability, traction, and rolling resistance (fuel economy) with manufacturers utilizing relevant standards based on the specific tire design criteria, including internal and external customer requirements.

Truck/bus tires are designed using variations in their dimensions, construction, and materials to meet a myriad of requirements such as the needs of the vehicle, expectations of the customer, operating conditions, regulatory requirements, industry standards, and internal company criteria. Differences among the design parameters make individual tires unique from others, and can impact everything from their traction characteristics to their durability properties. Given all of the possibilities, it is then clear why truck/bus tires are designed, developed, specified, tested, and evaluated differently from one another.

A Tire is Defined by its Specification

A tire is a highly engineered complex product, which is the result of a blend of chemistry and engineering. The chemistry pertains to the numerous rubber compounds used in the various components of the tire and the engineering involves the composite structure of the tire, which includes fabrics of steel, polyester, rayon, aramid, nylon, and/or other cords. From this standpoint, it is arguably the most technically advanced component of the entire vehicle.

A truck/bus tire typically contains twenty or more components and ten or more different rubber compounds. These components must work together to ensure that the tire performs satisfactorily for its particular load, application, or intended use. As a result, components, materials, and construction features will vary among different types of tires and applications. Although certain tires may share one or more common components, the unique performance requirements of each tire will result in differences between them which can be quite significant. In other words, the design and construction of a certain truck/bus tire differs from that of other truck/bus tires of the same or different size and intended use.

Numerous differences in design, construction, materials, functional characteristics and conditions of use serve to distinguish one tire product from another. Furthermore, the individual components of a steel-belted radial tire are designed to work in conjunction with the other components of that tire. As a result, the forces exerted on the tire during its operation are subject to the combined effects of many

parameters, including tire size; inflation pressure; component materials, dimensions and gauge; as well as vehicle characteristics. Therefore, it is not accurate to gauge the performance of any particular tire by focusing on isolated design or manufacturing characteristics, components, or compounds.

The tire that is the subject of this case was made to a unique specification. The specification identifies the tire size, overall type of construction, and markings on the tire; the number and type of components; the dimensions, gauges, and placement of each component; the manner and sequence of component assembly; and equipment used in assembling and curing the tire. In other words, the specification establishes the manner in which the numerous design and construction variables are combined to produce a particular tire. Therefore, specifications vary by tire type, size, and plant of manufacture.

Each individually prepared component in a tire has a particular role to contribute to the tire's performance. The components work in conjunction with one another to form an integrated tire product. Many components are comprised of one or more rubber compounds, while others are composites of rubber compound calendered with steel, polyester, nylon, rayon, aramid or other cords. A rubber compound is a blend of ingredients including natural rubber and/or synthetic polymer, carbon black, sulfur, oil, curatives, and pigments. Typical components in a truck/bus tire include the following:

- Tread-- A component comprised of one or more rubber compounds that contact the road, and in many cases a subtread/base rubber that is not necessarily exposed to the road. Each of the compounds can vary in type, location, and gauge and would be chosen to suit the particular tire under consideration. The tread pattern and final molded shape of this component is also specifically optimized for each tire design and/or application to meet desired performance parameters.

- Belt Plies-- Fabrics or layers of steel cord (typically) or other textiles embedded within layers of rubber compound, with variable thickness and width dimensions. The cords themselves are composed of numerous filaments with various configurations and overall gauges. The rubber compound used to surround and interlock with each type of cord is specially formulated to chemically react with and bond to it. The cords of each belt ply are variably oriented, positioned and spaced, including circumferentially and with bias angles, so that they provide desired tread stiffness characteristics.

- Body Ply-- A layer of steel cords (typically) that are embedded within a layer of unique rubber compound to form a fabric sheet to make up part of the tire

casing. The composition and material properties of the cords themselves and their end count can be varied. The configuration of the ply ends are also varied by design. In a radial tire, the orientation of the body ply cords is from one side of the tire over to the other side either with a zero-degree or low bias angle, predominately perpendicular to the circumferential, rolling direction of the tread.

- Innerliner-- A rubber layer that provides for air retention of the tire. It can vary in overall thickness, number of laminate plies or shape, and rubber compound formulation.

- Sidewalls-- Various dedicated, unique rubber compounds that form the protective and decorative outer side layers of the tire to resist cuts and abrasions and minimize rolling resistance among other roles. The size and shape of these components are customized to match the particular tire for which they are intended.

- Beads-- A bundle of steel wires and unique insulating rubber compound that form the foundation for the tire attachment to the wheel by anchoring the body ply and resisting the forces of inflation pressure. Beads can be produced into various configurations depending on the application.

- Bead Fillers-- Components formed of one or more rubber compounds that are varied in size and shape to affect the sidewall stiffness of the tire.

- Inserts, Chafers, Reinforcements, and/or Gum Strips-- Various rubber or rubber/textile components utilized to optimize the tire construction for durability and other performance parameters. These items can vary among tires in size, shape, and rubber compound formulation.

Due to the evolutionary nature of the development of a product such as a tire, specifications also change over time to reflect developments in tire technology and different vehicle requirements. The elements of the tire structure (including the rubber compounding and other materials such as steel cords), the mold design criteria, and the manufacturing processes advance independently of each other. Where advancements have been made at the component level, as in tread compounding or steel cord tensile strength, they are often selectively engineered into tires under development or in production at the time, regardless of the original design. Advances in mold design and tire manufacture are implemented along the way as well.

Manufacturing a tire is also complex since it is a composite, laminate assembly of numerous individually prepared components that must be integrated and cured. At

the assembly stage, the rubber compounds that make up the tire are soft, pliable, and tacky and the tire is commonly called "green" because it has not yet taken on its final shape and physical properties. The "green" tire is then physically shaped within a mold and chemically transformed, its components reacting and bonding, its rubber compounds becoming tough and resilient—all through a curing process (called vulcanization) involving heat, pressure, and time. Once cured, the tires are individually inspected and evaluated.

Ultimately, different truck/bus tire specifications result in the production of different tires that are similar to one another only in very general terms (round, black) in the same sense that different trucks are similar to one another (engines, shocks, springs, brakes). Tires typically take several years to progress through the concept, design, and engineering process, and specifications evolve separately over different time frames, even once put into production. For example, a Bridgestone-brand truck/bus tire intended for steer axle or all-position application in on-highway service produced in one year would likely be decidedly different in specification and performance from a tire produced in another year, even if it was the same model name and size designation. Tire specifications also vary within tire lines that share the same brand and/or model name due to having a broad range of tire sizes, load capacities, intended vehicle applications or other performance parameters such as speed rating.

Different tires result in different performance—performance that is dependent on the composite structure nature of the whole tire, as well as the separate components of the tire and their relationship to one another. Specification variations in components, materials, and other parameters affect the distribution of forces, stresses, and strains within tire structures and/or make a particular tire different from others in terms of performance factors such as durability, belt stiffness, belt edge strain, temperature generation, air permeation, ride comfort, and handling characteristics. Therefore, the only way to identify a tire is by reference to its unique design specification.

Tire Development Processes

As indicated above, a truck/bus tire is made up of numerous components of various dimensions and materials assembled in various configurations. Depending on the tire design and intended use, a truck/bus tire will have a multitude of different materials/fabrics and compounds in different quantities, densities, or dimensions that are configured, assembled, and cured together in a specific manner to form a finished tire. In designing a truck/bus tire it is necessary to know the type of vehicle (class 8, tractor, doubles, etc.), the type of service (local pickup/delivery,

long-haul, off-road, etc.) and market/customer expectations (fuel economy, wear, ride comfort, etc.). All of these factors will influence the tire engineer in the selection of design parameters such as components, materials, and configurations.

There is no single tire development process. The process differs depending on tire type, market/customer requirements, and the type of vehicle(s) for which the tire is to be developed. Truck/bus tire performance parameters and objectives frequently include the following:

- Tire size and dimensions necessary to meet performance and fitment requirements
- Load carrying capacity for the vehicle condition, whether lightly or fully loaded
- Speed rating/capability, whether on-vehicle or laboratory
- Ride comfort, whether by objective or subjective evaluation(s)
- Tread pattern and road noise targets
- Traction and handling characteristics, whether by objective or subjective evaluation(s)
- Fuel economy characteristics
- Durability testing, whether on-vehicle or laboratory
- Regulatory requirements
- Tread wear and irregular wear resistance, based on market expectations
- Retreadability
- Force and moment characteristics for vehicle/tire behavior and computer simulation
- Tire weight
- Air permeation, reflecting the normal rate of inflation pressure loss
- Balance and/or uniformity requirements

Whether engineering original equipment (OE) or replacement truck/bus tires, BATO utilizes state-of-the-art research and technology to design and develop tires. This includes computer modeling, advanced compounding with cutting edge polymers, and leading-edge test technology. Noting that limitations of science and engineering require trade-offs in some performance areas versus others, the goal is to push the tire design envelope and create an optimized tire design given the desired performance parameters—which can be many or few. Prototype tires are built and tested against the required performance criteria—and built and tested again until the objectives have been met.

Thus, tire development processes are designed to meet the requirements of many different entities in addition to the ultimate consumer, including the following:

- Vehicle manufacturers such as Paccar, Volvo, and Van Hool

- Independent tire dealers/retailers
- The U.S. Department of Transportation and other regulatory agencies
- Industry standards organizations
- The tire design/manufacturing company itself (internal requirements)

Among the most significant tests conducted and evaluated are durability tests designed to exert extreme forces on tires—numerous tests run the tires to total failure. Tires are also tested for traction/handling performance, including handling at the performance limits of the vehicle. It is the evaluation of these tested tires that assures the performance desired for the product when it reaches the consumer.

Post-Development

Once the tire development process is complete and specifications are established, the testing and evaluation process does not end—the quality control process includes continual monitoring of tire performance when new and in the field. Prescribed quality control standards and guidelines for tire manufacturing and durability performance assure to a high degree of certainty that the tires produced by BATO meet or exceed all applicable customer, regulatory, industry, and internal company requirements. BATO factories utilize industry-recognized quality management systems that establish continuous improvement procedures and policies.

One way tire companies, and regulatory agencies such as NHTSA, evaluate tire performance and customer satisfaction is through an analysis of adjustment data. An adjustment refers to the credit a purchaser or consumer receives at a retail outlet when a tire is exchanged under terms of a warranty or for goodwill, i.e. simply to maintain or foster customer satisfaction. The retailer may make the adjustment for a variety of reasons, including for durability conditions, cosmetic complaints, and dissatisfaction with ride comfort. The fact that a tire has been adjusted does not mean that the tire was defective, nor do adjustment rates indicate percentages of defective tires. However, through the compilation and assessment of such data, a tire manufacturer can identify product performance and customer satisfaction trends for such purposes as implementing countermeasures in appropriate situations, maintaining goodwill and enhancing business relationships, or for future product development.

Data from lawsuits and other claims are also compiled and evaluated by tire companies, as well as by NHTSA. This type of data is different from adjustment data in that it is not usually as timely and involves unique occurrences that require

individual, complex assessments. For instance, a tire from one claim or lawsuit does not explain what happened to another tire, or occurred in another crash, involved in a different claim or lawsuit. Like adjustment data, the fact that a tire has been involved in a lawsuit or claim does not mean it was defective, nor do rates of claim/lawsuit data indicate percentages of defective tires.

Certain models and sizes of truck/bus tires are available in different load ranges to meet the needs of different customers. For example, tires designed for all-position application in regional pickup and delivery service may be designed and manufactured in load range G (14 ply rating) and load range H (16 ply rating), the latter having substantially higher load capacity for those vehicles and cargo configurations that require it. Tires with higher load capacity put into harsher service may have different field performance responses and, not unexpectedly, higher rates of return than tires with less load capacity placed into less severe duty.

Ultimately, when tires are put into use they are the device through which all the actions of the vehicle are transmitted. They are subjected to a wide variety of use and operating conditions proportionate to the differences in the vehicles they are attached to, the use and maintenance habits of their owners/operators, the environments in which they operate, and infinitely possible random events that can inflict damage or affect their operation, such as punctures and impacts.

As science, engineering, and manufacturing technology have advanced, tires have advanced as well and offer an increasingly higher degree of utility, reliability, and value. Naturally, however, tires can be pushed beyond their limits for performance including for handling, wear, and durability. There has not been a tire produced to date that has unlimited capabilities in any respect.

Federal Motor Vehicle Safety Standards

Federal Motor Vehicle Safety Standards (see 49 CFR §571) are just a portion of the regulations intended to provide reasonably safe operational performance of vehicles and vehicle components and to protect the public from an unreasonable risk or harm in a crash. For truck/bus tires, there are specific endurance testing and performance requirements for resistance to tread separation and other tire failure modes. The test procedures include conditioning and high temperature protocols for evaluation of the integrity of tire components and the tire as a whole. FMVSS testing standards and other requirements of 49 CFR §571 reasonably and adequately ensure safe performance of truck/bus tires, including for resistance to tread/belt separation to protect the motoring public.

BATO's internal requirements have always required testing and performance above and beyond the FMVSS requirements.

Tire Failure Analysis in General

The mere fact that a tire fails or sustains damage does not indicate that the tire is defective. Tire failure or damage can be attributed to a variety of conditions other than a manufacturing or design defect. Tire failure and damage during operation can occur due to improper inflation or loading; injury from impacts, punctures, and other road hazards; improper repair or servicing, including from mounting/demounting; improper vehicle alignment and rim components; and operator driving habits. These conditions result in physical changes to the tire and/or affect the stresses and strains subjected to the tire components. Each failed or damaged tire that I have examined had its own service, use history, or other specific cause that explained the reason for its condition.

Visual and tactile scientific examination of the physical condition of an allegedly failed or damaged tire, often including testing and/or measurement, is generally necessary to verify the allegation(s) and determine cause of the failure or damage, if applicable. In addition, such an examination may reveal evidence of vehicle usage and maintenance practices that can adversely affect tires and contribute to the particular condition of that tire. Though it may be possible to rule out certain elements of the condition of a tire based upon known information, it is almost always impossible without specific and detailed information of the actual condition of the tire to definitively eliminate other tire conditions and other possible causes of tire damage or failure.

The customary procedure for conducting a thorough examination of a damaged or failed tire entails several essential components. A visual and tactile scientific examination of the tire, wheel, and/or other components is conducted utilizing high intensity lighting and magnification instruments. Observations of the condition of the tire are recorded. If necessary, the tire is carefully demounted from the wheel, utilizing proper procedures and equipment, and an examination of the interior of the tire is performed. The internal examination may reveal evidence of punctures, cuts, impacts, repairs, internal damage and a number of other conditions that otherwise could not be observed from merely examining the exterior of the tire. Non-destructive testing and measurements are typically conducted in matters involving litigation, such as with a durometer gauge to determine the hardness of the tire rubber at various points, which does not puncture or affect the physical integrity of the tire and leaves no visible marks. Additionally, the tire may be

examined with a microscope and digital imaging system, and/or an x-ray machine and monitor, each specially configured for use with tires.

Communication of Tire Information

BATO and the tire industry in general has for decades widely distributed reasonable and appropriate tire information to vehicle manufacturers, tire dealers/retailers, and consumers. This information takes a wide variety of forms including on-product specifications and warnings, warranty literature, safety pamphlets, owner's manuals, and posters, as well as a variety of direct training and audio-visual material. These materials commonly provide information about tire characteristics, performance and safety, including the potential for tire failure and serious personal injury. I have personally drafted and edited such information for BATO and tire and vehicle industry associations.

Examination and Material Review

The following tires, tire pieces, and wheels were provided for examination in this case (or other related matters):

- (1) tire with (1) tread/belt piece and (1) wheel, identified as the disabled tire and related components from the left front (steer) position of the truck tractor involved in this case ("subject left front tire"). This tire is summarized as follows:

  Bridgestone V-Steel Rib R283
  295/75R22.5 Load Range G
  DOT 2CBT 3WU 1314

  Based on the tire identification number, this tire was produced at a BATO factory in Warren County, Tennessee during the 13th week of 2014 (March 30-April 5, 2014).

- (1) tire, and later (1) wheel, identified as being from the right front (steer) position of the truck tractor involved in this case ("right front companion tire"). This tire is summarized as follows:

  Continental HSL2
  275/80R22.5 Load Range G
  DOT A3DF 1YJ 4911

Based on the tire identification number, this tire was produced at a Continental Tire factory in Mt. Vernon, Illinois during the 49th week of 2011 (December 4-10, 2011).

- (22) tire pieces, unrelated to either of the tires identified above.

On September 28 and 29, 2015, I conducted a visual and tactile scientific examination of the two tires, tire pieces, and the wheel included with the subject left front tire. On November 24, 2015 I examined the wheel identified as being from the right front position of the steer axle. The tires had been previously demounted by others. My examination notes and 172 photographs taken of the tires and wheels are incorporated herein, see Appendices B through F.

In addition to the tires, tire pieces, and wheels noted above, among the documents and other materials I have reviewed for this case (or other related matters) are the following:

1. Plaintiff Richard's Complaint and Jury Demand
2. Plaintiff Richard's Answers to Defendant Fedex' First Combined Discovery Requests to Plaintiff Richard
3. Plaintiff Richard's Answers to Defendant BATO's First Set of Interrogatories to Plaintiff Richard
4. Plaintiff Richard's Designation of Expert Witnesses
5. Report of Michael J. McCort, M.S., P.E. and Matthew S. Pittman, P.E., March 29, 2019
6. Vehicle inspection documentation and photographs, 2005 Chevrolet Venture
7. Deposition transcript of Aaron Richard, March 8, 2019
8. Plaintiff Gooden's and Plaintiff Cubillos' Initial Disclosures and First Supplemental Initial Disclosures (re: Gooden/Cubillos)
9. Defendants Bridgestone entities Initial Disclosures (re: Gooden/Cubillos)
10. Defendant FedEx Ground Initial and Supplemental Initial Disclosures (re: Gooden/Cubillos)
11. Plaintiff Gooden's and Plaintiff Cubillos' Responses to Interrogatories and Requests for Production (re: Gooden/Cubillos)
12. Defendant BATO's Response and Supplemental Response to Plaintiff Gooden's Request for Production (re: Gooden/Cubillos)
13. Defendant BATO's Response to Co-Defendant FedEx Ground's Interrogatories and Request for Production (re: Gooden/Cubillos)
14. Defendant FedEx Ground's Response and Supplemental Responses to Plaintiff's Request for Production (re: Gooden/Cubillos)
15. Defendant FedEx Ground's Response to Co-Defendant BATO's Interrogatories and Request for Production (re: Gooden/Cubillos)

16. Wyoming Investigator's Traffic Crash Report, Case No. P2014178331, including photographs
17. Deposition transcript of Chris Rodwick, August 14, 2015, with exhibits
18. Deposition transcript of Brian Kehler, August 18, 2015, with exhibits
19. Deposition transcript of Steven Marks, September 30, 2015, with exhibits
20. Deposition transcript of Ryan Mower, October 12, 2015, with exhibits
21. Deposition transcript of Robin C. Wright, October 13, 2015, with exhibits
22. Deposition transcript of John M. Smith, December 16, 2015, with exhibits
23. Deposition transcripts of David Johnson, February 24 and 25, 2016, with exhibits
24. Deposition transcript of Alan Bauman, March 23, 2016, with exhibits
25. Deposition transcript of Joshua Peter Byrd, March 23, 2016, with exhibits
26. Deposition transcript of Michael Sear, March 24, 2016, with exhibits
    Deposition transcript of James Kiriazes, March 28, 2016, with exhibits
27. Deposition transcript of Paul Bernstorf, March 29, 2016, with exhibits
28. Plaintiff Gooden's and Plaintiff Cubillos' Designations of Expert Witnesses
29. Report of Lew Grill, October 16, 2015, including attachments
30. Report of John M. Smith, October 19, 2015, including photos and attachments
31. Amended Report of John M. Smith, November 19, 2015, including photos
32. Photographs and videos taken by John Scott
33. *2014 Year Book*, The Tire and Rim Association, Inc.
34. *2014 Tyre Standards*, The Japan Automobile Tyre Manufacturers Association, Inc.
35. *2014 Standards Manual,* The European Tyre and Rim Technical Organisation
36. *Bridgestone Truck Tire Data Book*, 2014
37. *Michelin Truck Tire Data Book*, 2015
38. *Goodyear Engineering Data Book, Truck Tires*, 2010
39. *Bridgestone Truck Tire Limited Warranty and Safety Manual*, 2012
40. 49 CFR §392.7, §393.75, §397.17, §570, §571.119, §571.120, §574
41. <u>Traffic Crash Investigation</u>, Lynn B. Fricke and J. Stannard Baker, Northwestern University Center for Public Safety, 2014
42. <u>Traffic Crash Reconstruction</u>, Lynn B. Fricke, Northwestern University Center for Public Safety, 2010
43. <u>The Vanderbilt Rubber Handbook</u>, 14th Edition, R.T. Vanderbilt Company, Inc., 2010

44. The Pneumatic Tire, DOT HS 810 561, National Highway Traffic Safety Administration, 2006
45. *Radial Tire & Disc Wheel Service Manual*, American Trucking Associations, Inc., 2007
46. *Radial Tire Conditions Analysis Guide*, American Trucking Associations, Inc., 2011
47. *Care and Service of Truck and Light Truck Tires*, Rubber Manufacturers Association, 1998
48. *Commercial Medium Tire Debris Study*, DOT HS 811 060, National Highway Traffic Safety Administration, 2008
49. *The Critical Factor*, (video), Michelin
50. *Component Interfacial Tearing Appearances*, Bolden, Paper 51, ITEC 2004
51. *The Effect of Snaked Belt Anomolies on Tire Durability*, Herzlich, Paper 15C, ITEC 2000
52. *Belt Misalignments and Belt/Belt Tear Patterns*, Herzlich, Paper 29C, ITEC 2002
53. *Impact Simulations in the Lab*, Bolden, Smith, and Flood, "Tire Technology International 2001," 2001
54. *Impact Simulations—What Happens When a Tire/Wheel Impacts a Road Hazard*, Bolden, Smith, and Flood, "Tire Technology International 2005," 2005
55. *Structural Impact Damage Under Varying Laboratory Conditions*, Bolden, Paper 17B, ITEC 2006
56. *Analysis of Steel Cord-Rubber Interface by SEM/EDX Controlled Experiments*, Leyden, Paper 4A, ITEC 2000
57. *Compression Grooving and Rim Flange Abrasion as Indicators of Over-Deflected Operating Conditions in Tires*, Schnuth et al., Standards Testing Laboratories, Paper 51, American Chemical Society, 1997
58. *Compression Grooving as an Indicator of Over-Deflected Operating Conditions in Tires*, Schnuth et al., Standards Testing Laboratories, "Testing Technology International 1998," 1997/1998
59. *Effects of Over-Deflection on the Tire/Rim Interface*, Schnuth et al., Standards Testing Laboratories, Paper 31A, ITEC, 1998
60. *Rim Line Grooves as an Indication of Underinflation or Overloaded Tire Operation in Radial Tires*, Grant, Paper 45, ITEC, 2004
61. Rapid air loss demonstratives
62. Tire specifications, technical drawings, and performance requirements
63. Adjustment, claims, case/lawsuit, and production data
64. Corporate and factory standard practices

Conclusions

Within a reasonable degree of scientific certainty, based on my education, experience, and analysis of the subject matter to date, I have reached the following conclusions in addition to the observations, opinions, and conclusions expressed elsewhere in this report:

1. Bridgestone V-Steel Rib R283 tires were competently and appropriately designed and manufactured in accordance with tire industry practices utilizing proven design principles, compounds, materials, and manufacturing techniques. They were designed and manufactured to comply with DOT Federal Motor Vehicle Safety Standards (including 49CFR§571.119), tire industry standards, and BATO standards applicable at the time of production. R283 tires have not been subject to a recall, are not defective or unreasonably dangerous in design, and are not known to have systemic manufacturing defects or deficiencies affecting them.

2. The subject left front tire submitted for examination, a 295/75R22.5 Load Range G Bridgestone V-Steel Rib R283 was reasonably and appropriately designed, manufactured, marketed, and sold by BATO. The subject tire was not defective or unreasonably dangerous in design or manufacture and was fit for the purposes for which it was intended. The tire complied with the DOT Federal Motor Vehicle Safety Standards (including 49CFR§571.119), tire industry standards, and BATO standards applicable at the time of production.

3. The subject left front tire experienced a failure condition known as a tread/belt separation with partial detachment of tread and belts and rapid air loss. All makes, models, and sizes of truck/bus radial tires are subject to this typical failure condition.

4. The mere fact that a tread/belt detachment, or any other type of failure, occurs does not indicate that the tire malfunctioned or was defective. All makes, models, and sizes of tires are subject to failure, which can occur for a number of reasons not related to the design or manufacture of the tire. Conditions that can cause tire failure (such as a tread/belt detachment) include overloading, underinflation, punctures, improper repairs, road hazard damage, impact damage, mounting damage and so forth. These conditions result in physical changes to the tire and/or affect the stresses and strains subjected to the tire's components.

5. The cause of the failure of the subject left front tire was damage from overdeflected operation that was exacerbated by usage at excessive speeds. Subsequently, the tire also sustained impact damage. At the time of the failure, the tire had apparently been driven over 50,000 miles.

6. Overdeflection is caused by underinflation, overloading, or a combination of the two. Overdeflected tire operation causes excessive stress, strain, and heat build-up at the belt edges, which in turn causes incipient cracking and crack growth propagation, typically between the second and third belts of truck/bus tires as is the case here. If such operation continues, the tread and/or belt(s) may become detached from the tire at highway speed when sufficient centrifugal force is encountered. In this case, the overdeflection is most likely due to underinflation as a result of improper inflation pressure maintenance. The subject left front tire exhibited rim compression grooves and belt rubber fracture patterns indicative of overdeflected operation. In addition, undulating flange wear to the rim is exhibited. Tire inflation pressure must be checked with a gauge. Proper inflation of a radial tire, including truck/bus tires, cannot be determined visually or by striking the tire with any kind of object; such methods are inaccurate and unreliable. Drivers Mr. Kehler and Mr. Marks, employing such methods in haphazard intervals, did not properly check or maintain inflation pressures. Neither driver even properly identified the correct inflation pressure specification, at best targeting 5-10 psi too low for the front tires.

7. Excessive speed can cause or aggravate internal structural damage of a tire, particularly in combination with the damaging effects of overdeflection. Excessive vehicle speed at a minimum increases the rate of tire deflection cycles. As a result, the tire builds up additional heat which adversely affects rubber material properties and thus leads to or contributes to ongoing structural damage. The subject left front tire exhibited belt rubber fracture patterns and discoloration indicative of excessive heat. Testimony of the drivers and GPS data indicate regular operation (including the day of the crash) above the 75 mph maximum speed restriction for the tires, the same limitation imposed by Mr. Rodwick (the drivers testified they were not aware of Mr. Rodwick's position). The vast majority of highway truck/bus tires have speed restrictions that vary from 55 mph to 75 mph.

8. The subject left front tire exhibits detached surfaces with multi-plane fracture and tearing patterns associated with adequate adhesion and fatigue, crack propagation, and tear resistance properties. Such an appearance is typical of a properly designed and manufactured tire that has sustained a tread/belt separation and/or detachment that has resulted from damage or other external factors during use.

9. The right front companion tire (Continental HSL2) does not match the subject left front tire (R283) in either size or type. Steer tires on a truck tractor should at a minimum match in size, and generally match in other characteristics (such as tread pattern and intended use). Mismatch can not only result in poor performance for tread wear or fuel economy, but can lead

to irregular vehicle handling characteristics and wear/tear on vehicle components that could lead to a malfunction. The mismatch in this case, which should have been known to the operators of the truck, is further indication of improper tire/vehicle maintenance practices and lack of due care. Given their condition and mismatch, neither the subject left front tire nor the right front companion tire should have been in service on the day of the crash.

10. The additional 22 tire pieces provided for examination do not match the subject left front tire. Most are pieces from other truck/bus tires not involved in this case. There are at least six distinct truck/bus tire tread patterns represented, and pieces from three different passenger or light truck tires.

11. The subject left front tire does not exhibit any belt anomaly that caused or contributed to the tread/belt separation, detachment, or rapid air loss condition.

12. The subject left front tire was appropriately marked, consistent with industry practices and regulatory requirements. BATO provided clear and appropriate information and recommendations regarding application and intended use, including for speed. The actual speed recommendations for truck/bus tires are dependent on a variety of factors including the vehicle application, type of service, and maintenance practices.

13. The truck drivers, at times at odds with each other but nonetheless both deficient in their expressed understanding and execution of proper tire maintenance (inflation) and operating practices (speed, matching on an axle), did not have sufficient training or oversight by FedEx Ground/CLR to prevent the tire failure and subsequent crash in this case. Both the drivers and their employers, FedEx Ground/CLR, failed to meet their respective standards of care regarding these fundamental issues.

In closing, this report summarizes my analysis to date of the subject matter. If additional information becomes available, I reserve the opportunity to amend or supplement observations, opinions, and conclusions contained in this report.

Respectfully Submitted,

Brian J. Queiser

BRIAN J. QUEISER

EDUCATION

Bachelor of Science, Aeronautical and Astronautical Engineering
Purdue University, West Lafayette, Indiana, May 1992

Master of Science, Engineering Mechanics
The Ohio State University, Columbus, Ohio, March 1994

CONTINUING EDUCATION

Vehicle Dynamics
Northwestern University Center for Public Safety, Evanston, Illinois, October 2001
Traffic Accident Reconstruction 1
Northwestern University Center for Public Safety, Evanston, Illinois, April 2003
Applied Vehicle Dynamics, C0414
SAE International, BeaverRun, Pennsylvania, October 2006
Strategy and Innovation Series
Case Western Reserve University, Cleveland, Ohio, February 2008
Applied Heavy Truck Dynamics, C1415
SAE International, Greenville, South Carolina, September 2015
Advanced Vehicle Dynamics for Passenger Cars and Light Trucks, C0415
SAE International, Troy, Michigan, September 2016
Certified Automotive Tire Service (ATS) Program, Advanced Instructor
Tire Industry Association (TIA), Joliet, Illinois, October 2016
Certification renewed in January 2019
Reconstruction and Analysis of Motorcycle Crashes, C1506
SAE International, El Segundo, California, October 2018

EXPERIENCE

National Aeronautics and Space Administration (NASA)
Cooperative Student Internship—Summers 1990, 1991, and 1992
Assisted engineers in engineering, computer, and project management tasks during programs for the Defense Nuclear Agency and others.

Transportation Research Center Inc. (TRC)
Engineering Internship—Summer 1993
Supported engineers in dynamics testing of a wide variety of vehicles, from passenger cars to tractor trailers. Duties included preparation of tests, vehicles, procedures, instrumentation, data analyses, and reports.

BRIAN J. QUEISER

Bridgestone/Firestone, Inc., continuously to current employer, Bridgestone Americas, Inc.

Advanced Tire Technology Division—January 1994 to August 1995
Initially, Jr. Engineer with a promotion to Engineer. Engaged in specialized noise, vibration, and other engineering mechanics/dynamics projects involving tires and tire/vehicle systems.

Passenger and Light Truck Tire Development Division—August 1995 to March 2001
Successive promotions to Project Engineer. Developed or contributed to tire designs and constructions for use as original equipment and in the aftermarket. Responsibilities included computer aided engineering and finite element analyses, mold shape design, tread pattern design, compound and material selection, tire building and curing specification, and tire testing and evaluation.

Product Analysis Department—March 2001 to present
Initially, Senior Product Engineer with promotions to Manager in June 2005 and Director in August 2012. Responsibilities include technical consultation on tire design, development, engineering, specification, manufacturing, retreading, standards, quality assurance, testing, performance, marketing, distribution, sales, and application; tire failure and damage analysis; vehicle crash analysis; tire and vehicle risk prevention/management; and tire safety, maintenance, and education. Includes consultation and representation of the company or its affiliates to external entities including government agencies and industry organizations.

ADDITIONAL BACKGROUND

Publications: *Introduction to Tire Safety, Durability, and Failure Analysis*
Gardner and Queiser, Chapter 15 of The Pneumatic Tire,
NHTSA, DOT HS 810 561, Washington, D.C., 2006

Tire Examination After Motor Vehicle Crashes
Queiser, McClain, Jr., and DiTallo, Chapter 13 of Traffic Crash Investigation,
Northwestern University Center for Public Safety, Evanston, IL, 2014

Patents: Co-author of four (4) U.S. and numerous foreign patents in the area of tire tread design

Member: SAE International (formerly Society of Automotive Engineers)
The Tire Society